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Coal as Electricity

Some Points for the Utilisation Council

ONE of the principal aims of the plan of campaign outlined at the last National Coal Convention for increasing the consumption of solid fuel is an improvement in the standard of "heat comfort." Mr. M. Anderson (the director of the Coal Utilisation Council) estimated that to keep the public properly warm would result in the use of at least eight million more tons per annum. This ambition should be capable of realisation on one condition. In raising the standard above that which is at present regarded as just satisfactory to what would be looked upon at first as a "luxury" level, no more labour should be entailed than is required to operate a switch.

Since convenience rather than necessity would be the controlling influence, the success of the campaign in the domestic sphere depends largely upon the development of electric space heating. Support for this argument is to be found in the recently published annual report of the Coal Utilisation Council, in which it is submitted that the amount of solid fuel now sold in the domestic market is at least as great as it was twenty years ago. Added to this, of course, is the coal consumed in producing the enormous increase in kWh supplied to domestic consumers during the same period. This means, of course, a net gain to the collieries that is due to the improved standard of comfort that has been made possible through cheap electricity.

Transport Possibilities

Although Mr. Anderson did not, in this case, draw the logical conclusion, he referred to several other ways of increasing the coal output through electrification, so compensating for a falling-off in other coal-using trades. Trolley-buses, for example, have more than offset the loss due to the decline in the number of tramcars, and in spite of the competition of oil-engined buses he believes that the tonnage required could be raised by one-third to a total of one million tons. This seems not unreasonable in view of the better service expected of public vehicles nowadays.

His views are borne out by statistics in the report previously referred to, where the prospects of the battery vehicle are indicated by the statement that about half of the 500,000 commercial goods vehicles licensed operate only in urban areas and on an average thirty miles a day. This the 4,000 existing battery vehicles, each taking up to 6,000 kWh per annum, easily accomplish now.

Rural electrification is given as another outlet for electricity which would benefit the collieries, but no reference is made in the report to the potentialities of the field for electric power and heat in industry. Leaving out of account the effect of increasing the horse-power installed per employee by the aid of cheap electricity and considering only present standards, there is the competition of the heavy-oil engine for private plants to be recokned with. Private plants generate about a quarter of the electricity used in Great Britain. What proportion is derived from oil is not recorded, but as a million tons or so of imported fuel oil is consumed per annum in industry, the requirements for power production and for the industrial heat that could be provided electrically, assuming low prices per kWh, must be of considerable magnitude.

Cheap Power for Collieries

Again, cheap power from the public mains has helped the collieries themselves to reduce their costs of production. Between 1930 and 1935 (the latest official information available), although there was a slight decline in the total kWh used in mines, the kWh purchased from electricity supply undertakings increased by one-third.

So far the interests of coal and its derivative electricity would appear to be the same. There is a divergency, however, and this is due to the desire of the coal industry to retain its market for large coal. The demand for slacks, duff and rough smalls now exceeds the supply, and coal-breaking and crushing plant has therefore been installed at a number of collieries. This, no doubt, adds to the cost of production, but surely not to the extent reflected in a rise in the average price at power stations of 37 per cent. within three years. In this increase discrimination has been made against electricity supply undertakings, and the old warning against "killing the goose that lays the golden eggs" has seemingly been forgotten.

Briefly, is the coal industry content merely to take its profits as quickly as possible or does it really want to sell more and more coal by making the fullest use of the convenience value of electricity?

Fire-Resisting Cable

An otherwise reliable protective system may fail to function at the critical moment should the wiring become involved in the initial stages of an outbreak of fire, as was illustrated in the trouble at Kingston last December. In the official report on the occurrence, the need was emphasised for protecting all control and protective gear circuits with non-inflammable fire-resisting cable. A substantial contribution towards this end has appeared in a new C.M.A. cable, the dielectric of which is itself fire-resisting. Tests that we have witnessed on samples bear out the claim that the application of intense heat damages only the part of the cable immediately in contact with the flame, and that the insulation ceases to burn immediately after removal of the source of heat. The use of this type of cable is not, of course, confined to electrical control systems; indeed there should be considerable scope for it in the many situations in which the spreading of a fire might have serious consequences.

Radio Interference

AT the Television Convention held at Radiolympia last week, the problem of interference with television cropped up several times. Sir Noel Ashbridge, stating that the service area of the Alexandra Palace transmitter could be put at 35 miles radius from the station, pointed out that, were it not for interference, the range of reception would be much greater. A statement by the Radio Manufacturers' Association on the subject of interference was read. The chief points in it were that excellent progress had been made, although the Postmaster-General was not yet in a position to introduce legislation, and that the R.M.A. had agreed with the British Standards Institution regarding specifications for interference-free apparatus. Admittedly, interference with television reception comes mainly from motor vehicles, but domestic and industrial electrical equipment is also a source of trouble, not only to television, but also to ordinary sound reception. Interference suppression devices are shown on a number of stands at the Radio Exhibition and causes and remedies are exhaustively treated in the manual on "Radio Interference Suppression," by G. W. Ingram, to which reference was made in our last issue (p. 259).

Next Week

THE present may seem an unpropitious time for the discussion of lighting matters but, after all, even if we must not permit light to be visible from the skies we cannot dispense with it. We had already planned our annual lighting number and commissioned well-known illuminating engineers and designers to deal with various aspects of lighting and we see no reason why their articles should not appear next week as planned. Readers can therefore look forward to receiving some authoritative information and guidance in the matter of lighting in our September 8th issue. The Association of Public Lighting Engineers up to Wednesday afternoon was intending to proceed with its annual conference at Glasgow next week, but in view of the uncertainties of the situation it had to decide to postpone the conference. An interesting programme had been arranged.

A.R.P. Illumination

AN underlying principle of four British Standard Specifications that have been issued this week is that some light would be necessary during a war emergency, but that it must not on any account be visible to aircraft. Thus, shelters should be adequately lighted at a low voltage that has been stepped-down from the supply mains, but a battery should be installed as a stand-by and torches might also be required. The ordinary electric torch is, however, unsuitable for outdoor use under restricted lighting conditions; its light must be properly directed and screened. Similarly, at any time during the restrictions the light from a shop interior must not be allowed to fall on the footpath outside; a simple form of air-lock has been devised so that those entering or leaving the premises may not offend against the regulations. As it might be necessary to have external lighting for carrying out essential work, even during an air raid, special fittings have been designed to give an even illumination of 0.002 ft.-candle. This value may be increased to 0.02 ft.-candle, provided the lamps can be immediately extinguished in emergency. As a result of experience in this connection a joint committee of the Illuminating Engineering Society and the Home Office A.R.P. Department has come to the conclusion that effective and adequate illumination for the carrying out of work in factories is only practicable on the assumption that means are provided to screen completely, by opaque materials, any visible upward and outward emission of light from windows.

The Trolley-Bus

The present state of affairs emphasises more than ever before, the desirability of adopting methods which are independent of imported commodities. This is why we draw particular attention to the article on "Trolley-bus Progress" which appears in this issue. The arguments in favour of the trolley-bus have been stated so often that we feel it unnecessary to repeat them. Mr. Cansdale shows that progress has been largely due to the policy of the London Passenger Transport Board; other authorities, with a few bright exceptions, have replaced their abandoned trams by motor buses. There have been some notable orders from the Dominions for English-made trolley-buses, and interest is increasing considerably in the United States and France. It is imperative that transport managers, faced with the conversion of tramway systems, should examine the possibilities of the trolley-bus thoroughly and without bias.

Northern Ireland Supply

The Belfast Harbour power station is responsible for the supply of electricity to the greater part of Northern Ireland; the Electricity Board in 1938 purchased about 90 per cent. of its requirements from Belfast Corporation. It is apparent that this eggs-in-one-basket arrangement is particularly unsatisfactory at the present time, and the Corporation is seeking to better its position. The principal proposal is the erection of a station on another site at a cost of over £1,000,000. Of equal interest is a suggestion that the Northern Ireland and Eire systems should be linked up. There are times when the Shannon scheme has surplus energy to spare, and others when a considerable supplement of steam generated power is needed. It is thought that in these circumstances, the two systems would be found complementary, and prove economic to both sections of Ireland. If the plan is feasible it would be a pleasant thing to see such co-operation between North and South.

Stand-by Lighting

OUR contemporary, the *Gas Times*, is pessimistic about the reliability of electric lighting during an emergency and suggests that it should be backed up by gas lighting at all vital points. As there are so many positions which may be considered vital this would mean a pretty extensive system of gas lighting. It is suggested that gas breakdowns are very limited in area while electrical stoppages are widespread. The fact is that things are not really so bad as that and while an alternative lighting system is of course most desirable the installation of gas may introduce other dangers. If duplication is essential it will probably be better to rely upon an alternative supply of electricity, either in the form of connection to another source of supply or an independent stand-by battery plant. Another point is that while our contemporary emphasises the vulnerability of overhead lines it is more probably street mains which would suffer and in that event cables and gas pipes would be equally involved.

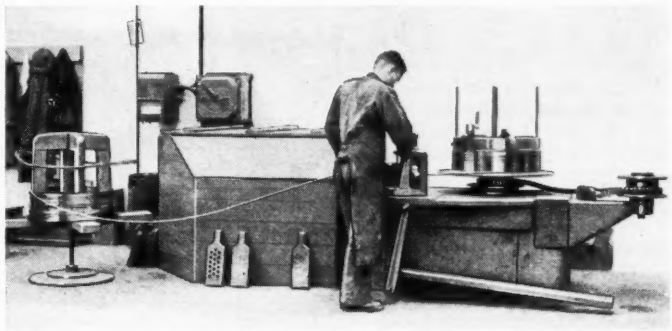
RESISTANCE ALLOYS

Production Methods in a Scottish Works

THE requirements of electrical equipment manufacturers with regard to their supplies of alloys for heating elements, rheostat resistances, &c., are becoming increasingly exacting as greater demands are made on the equipment by way of safety, endurance and temperature.

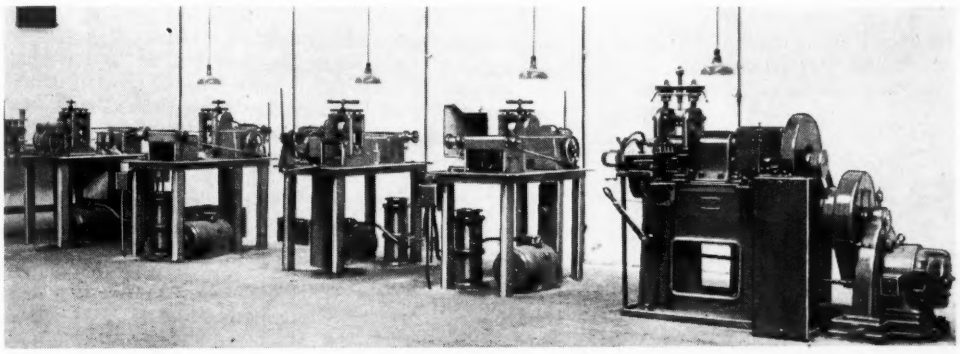
Recently, by the courtesy of Mr. F. L. Smith, B.Met., we had the opportunity of seeing at the Musselburgh works of Gilby Brunton, Ltd., the skilful treatment to which the special alloys are subjected in the various drawing and rolling operations in the preparation of the materials for the equipment manufacturers.

Raw material is received in the form of hot rolled rod of nickel-chrome or other alloys. The rod is of about $\frac{1}{4}$ in. to $\frac{5}{16}$ in. diameter and in 1-cwt. coils, and as it is hard the first operation is to anneal it. This is effected in an oil-fired furnace housed in a pit with the top just above floor level. The coils are stacked on racks on which they are carried to and lowered into the heated furnace by a little runway crane. The coils are then removed for rapid cooling.



Single-block (24 in.) heavy-wire drawing machine

After an all-night pickling in dilute acid in lead-lined tanks the coils are stacked on one end of the beam of a motor-driven battering machine where they are subjected to violent upward jerks and downward drops of the beam, with the result that any remaining scale falls off. Dipping in hot lime then renders the surface of the rod ready to receive the necessary lubricant for subsequent drawing operations, before which the lime is dried in a coke-heated oven.



Line of wire flattening rolling mills

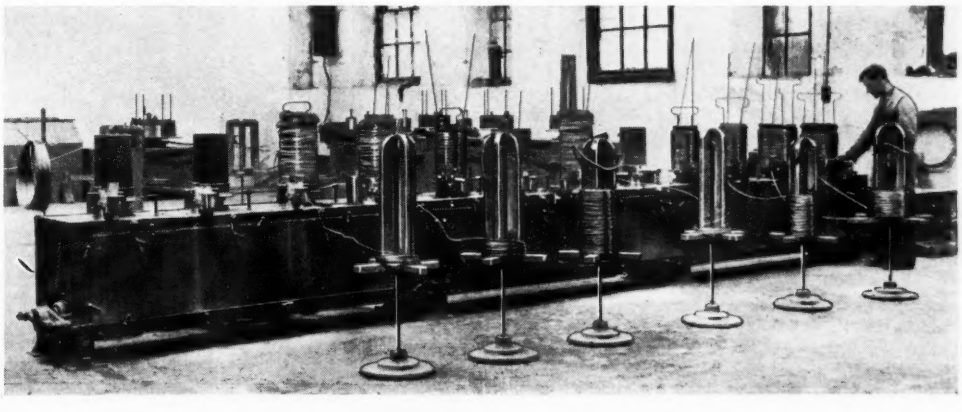
For reception in the heavy-wire drawing machine the end of the rod is first pointed in a little motor-driven set of rolls with progressively sized grooves. The rolls run continuously but there is a gap on one part of each pair of grooves (top and bottom) so that the rod end can be inserted against the direction of the rolls. As the gap is closed up, the rod end is rolled back and thereby reduced in diameter.

The heavy-wire drawing machine is driven by a 45-HP motor and it reduces the rod to No. 10 SWG through five steel dies separately. The pointed end is pushed through the die and a dog chain draws a sufficient length of wire through to afford clamping on the drawing block of the machine.

By this time the wire is hard again and the annealing, pickling and liming operations are repeated.

The No. 10 SWG wire is next reduced to No. 15½ gauge through steel dies on a four-block machine. The four blocks are mounted on a table cabinet in which are a shaft driven by a 20-HP motor and, serving under each block, bevel gearing and a friction clutch through which the block is driven. Again back for annealing and cleaning and then the wire is further reduced to No. 19 SWG, this time through tungsten-carbide dies on a 12-in. block machine driven by a 12½-HP geared motor unit.

At this and later stages annealing is effected in a bright annealing furnace which was built by Gilby-Brunton and equipped with elements made from the company's products. The furnace frame was made locally. It has a firing chamber about 1 ft. deep, 3 ft. wide and 13 ft. long. The elements are arranged at the top and bottom of the chamber in grooved fire bricks. The full loading is 45 kW, and there are altogether 18 elements arranged in two groups of nine elements each. Each group of nine elements is balanced on the three-phase supply, one group being loaded at

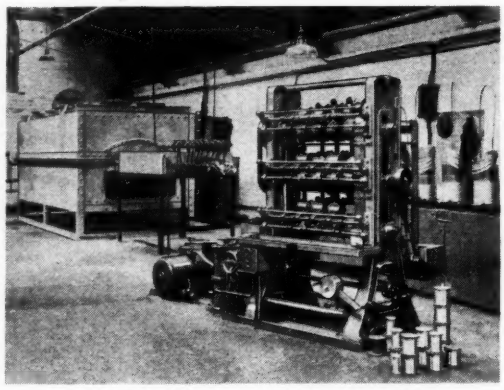


Twelve-block (12 in. and 8 in.) medium-wire drawing machine

20 kW and the other group has a loading of 25 kW.

Each group of elements is separately controlled by an Igranic contactor equipment and both contactor units are switched on automatically in the morning by a time switch. But the contactor equipment governing the 20-kW or booster group of elements must first be set for the switching-in operation by means of a push-switch on the Foster automatic temperature regulating equipment which operates in conjunction with a pyrometer inserted in the furnace top.

When the temperature reaches 1,050 deg. C. both contactors operate and switch off the whole of the elements. Then, unless the booster element contactor is reset for switching in, the 25-kW group remains normally in operation under automatic temperature control with a ± 5 deg. differential on the temperature regulator.



Bright annealing furnace showing drawing-off machine

The inert or non-oxidising gas (a mixture of nitrogen and hydrogen) in the heating chamber is produced in the works in an I.C.I. equipment in which liquid dry ammonia is allowed to gasify and pass over electrically heated catalysts which split the ammonia into hydrogen and nitrogen. Coils of wire for annealing are mounted on swifts and bobbins at the feeding end of the furnace and they pass individually through tubes into the furnace chamber.

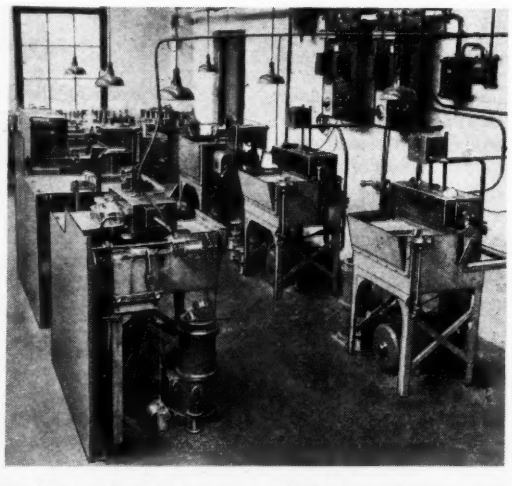
Emerging in a similar manner from the delivery end of the furnace, the wires are drawn either on to blocks similar to those of the wire drawing machines but without reducing dies, or, in the case of the finer wires, on to bobbins on a winding machine. Uniformity of winding speed is ensured on this machine by driving the bobbins directly from the wire surface, the face of each bobbin resting on the face of a driving pulley.

A B.T.H. variable-speed motor serves this winding machine, first with a belt drive to the main shaft from which are belt driven three shafts carrying the pulleys. Flat or ribbon wires are drawn on to a special winding machine with a screw-driven wire guide to prevent lapping of the ribbon on the reel.

Particular attention is paid to the question of non-lapping, and the winding operation is under the constant care of an expert operative.

After a further reduction to No. 25 SWG wire on an eight-block machine with tungsten-carbide dies and similar driving arrangements to those of the drawing machines already referred to, further reductions down to as low as No. 50 SWG (0.001 in.) are effected on multiple die drawing machines. These machines each have a couple of blocks over which the wire travels from one to the other as it passes successively through diamond dies which are centrally arranged between the two blocks. The blocks, wire and, of course, dies, are immersed in a soap solution for lubrication and cooling.

On a 12-die machine the No. 25 SWG wire is reduced to No. 34 SWG, while further reductions are made on similar machines with fewer dies. These machines for the finest wires have incorporated in them small electrically heated furnaces through which the wire is passed for annealing on its way to the winding reel, after leaving the final die.



Battery of wet fine-wire drawing machines with incorporated annealing furnaces

These little furnaces are in principle very similar to the separate large one, and each machine is driven by a 1½-HP variable-speed motor equipped with belt transmission on to the blocks and chain drive on to the winding reels.

For the production of flat wires for such purposes as iron and convector elements the round wire is treated to a number of passes through small self-contained rolling machines, according to the reduction which is required and the width of the ribbon.

These machines all have drives similar to those of the fine-wire drawing machines, and each has push-button control. Two representative examples of the production from these machines are—0.025 in. × 0.002 in. ribbon from 0.0075 in. round and 0.125 in. × 0.0253 in. ribbon from 0.072 in. round. The former is suitable for iron elements and the latter can be used for small furnace work.

A sample from every finished reel of wire is carefully measured for the resistance per foot on a Wheatstone bridge and the data is marked on the end of the reel. The production limits of error are ± 5 per cent. of the theoretical resistance of the wire.

The treatment of worn diamond dies is highly specialised work which is carried out in a self-contained department. The worn dies are ground to the next largest size on little bench machines on each of which an ordinary sewing needle coated with diamond dust and oil revolves and moves to and fro within the die.

A representative rate of increase of the die diameter is 0.003 in. per hour. The size of the die at any stage is determined by drawing a piece of wire through it and measuring the resistance of the drawn wire. Several draws are sometimes necessary before the correct size of die is arrived at.

Heat Insulation

A discussion on "The Properties and Testing of Heat-Insulating Materials," organised by the Joint Committee on Materials and their Testing in conjunction with the Institution of Gas Engineers, has been arranged in London on November 23rd. Papers will be contributed as follows: "High-temperature Insulating Material": British Refractories Research Association (Great Britain); Dr. J. B. Austin, United States Steel Corporation (United States). "Low-temperature Insulating Material": Dr. Ezer Griffiths, F.R.S., National Physical Laboratory (Great Britain); a paper from an authority in the United States. "Insulation of Buildings": Mr. A. F. Dufton, Building Research Station (Great Britain); Professor F. B. Rowley, University of Minnesota (United States). "Mechanical Engineering Applications of Insulation": Messrs. J. S. F. Gard, Washington Chemical Company (Great Britain), Cope and Kinney, Detroit Edison Company (United States). In addition, Professor M. P. Brémond, of the Manufacture Nationale de Sèvres, France, will review the position of heat-insulating materials on the Continent, while Professor E. A. Allcut, of the University of Toronto, will deal with the subject from the Canadian point of view.

TROLLEY-BUS PROGRESS

By J. H. Cansdale, A.M.I.E.E.

IN the field of modern transport the trolley-bus has now reached an assured position and, with those who travel, it is certainly the most popular of all public service vehicles. Where as in 1922 about 75 trolley-buses were in service in the whole country, by 1938 there were 2,600. During the same period the number of tramcars in service decreased from 14,300 to 8,900. These figures are shown graphically in fig. 1, which also indicates the change in route mileage. Both the number of trams and the tramway route mileage are decreasing at a rapid rate and this is likely to continue for the next two or three years until the London programme is completed.

Mr. J. H. Cansdale is a traction engineer with the B.T.H. Co.
[Elliott & Fry.

It does not follow that the country as a whole will scrap all trams because this is being done in London. In many large cities, such as Sheffield, Liverpool, and Glasgow, modern trams are operating very satisfactorily and no change is contemplated. On the other hand, those places which were operating small systems, often with obsolete cars and equipment, have for the most part already closed them down. It is among these smaller systems that the motor-bus has been substituted more often than the trolley-bus, so that, over the last seventeen years, although 4,200 trams have been scrapped, only 2,500 trolley-buses have been installed. At the present time, largely due to the London change-over, four out of every five trams which are being scrapped are being replaced by trolley-buses.

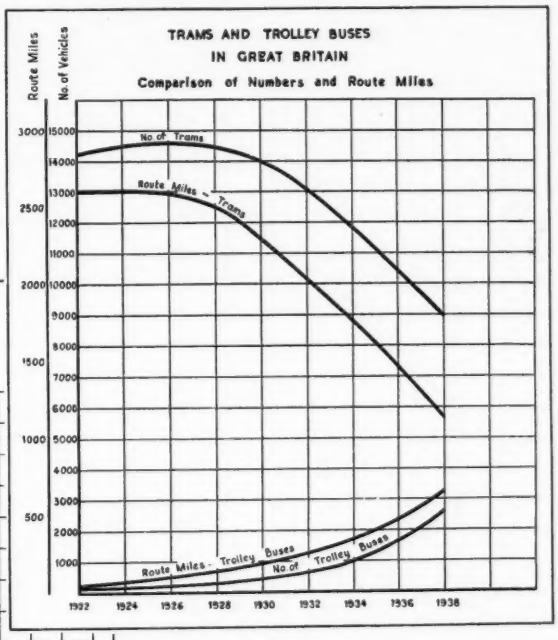
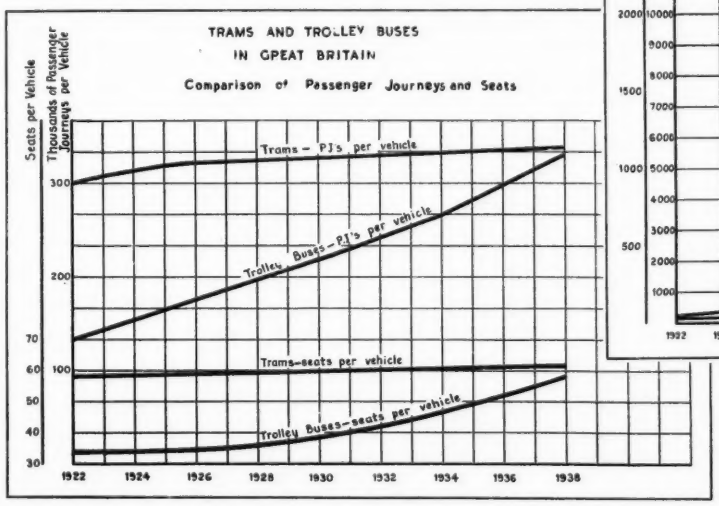


Fig. 1.—Comparison of tramcars and trolley-buses in service and route miles operated



Left, Fig. 2.—Passenger journeys and seats per vehicle

At one time it was generally considered that a trolley-bus was very much inferior to a tram in seating capacity and this was certainly true of the early vehicles. Fig. 2 shows the very great improvement effected in seating capacity since 1922, when the average for the country was thirty-four. The present average is fifty-eight, and for the trolley-buses of London Transport alone the average is actually sixty-eight. The present figure for trams is sixty-two, so that the modern trolley-bus is now at least equal in this respect. Fig. 2 also shows the passenger journeys per vehicle over the same period. Due to the elimination of many of the small and uneconomic systems, the figure for trams has increased from 300 passenger journeys per annum to 340; in the same time that for trolley-buses has advanced from 133 to 330 showing that, in this respect also, the trolley-bus is now equal to the tram.

In regard to the London Transport change-over, fig 3 shows the number of vehicles and the relative number of car miles run during each year. Assuming progress at the present rate, the programme should be completed by about the beginning of 1942 when the trams will be replaced by about the same number of trolley-buses. The annual car miles have actually been increasing since the introduction of trolley-buses, and it may be assumed that the improvement will continue at the same rate.

Lighter Motors

The first trolley-bus motors were merely tramway motors adapted for the purpose, and in 1923 a standard series motor, 40 HP at one-hour rating, weighed 1,500 lb., or 37.5 lb. per HP. The latest compound-wound motor with a one-hour rating of 100 HP weighs 13 lb. per HP, and so is actually lighter than the original motor of 40 HP.

The improvement has been obtained by the use of light-weight alloys for many parts, by permitting a higher temperature rise due to the use of class B insulation, and also by better ventilation and higher speed. With this motor an initial acceleration of from two to three MPH per sec. can be obtained and a speed of 30 MPH can be attained in 22 sec. with a bus weighing, with an average load, 11.25 tons.

Due to a maximum depth of 19 in. only, it is possible to mount the motor under the floor, thus saving valuable space as compared with a cab mounted motor and, in addition permitting a short drive to the back axle.

The single compound-wound regenerative motor is now used almost exclusively in this country. The actual amount of regeneration is not great (probably 5 to 15 per cent.) but it is sufficient to provide a useful method of checking the vehicle when driving in traffic and, compared with the ordinary series motor, it has the great advantage of a wide range of economical

A 1923 trolley-bus

running speeds. It has the advantage also that the energy consumption is less dependent on good driving than with a series motor.

The London trolley-buses are equipped for rheostatic braking and, following this example, there is a strong tendency to have it installed on most new buses. Braking is obtained by exciting the shunt field from the line and connecting the armature across a section of resistance. The series winding is usually included in the braking circuit, as its differential action limits the maximum braking torque. By suitably grading the shunt field steps, smooth but powerful braking can be obtained and in normal operation it effects a great saving on brake linings, by relieving the mechanical brakes except for the final checking of the speed before coming to rest.

In some cases difficulties have been experienced with regeneration on systems which are not entirely suitable for it. Where, for instance, the route is sectionalised and each section

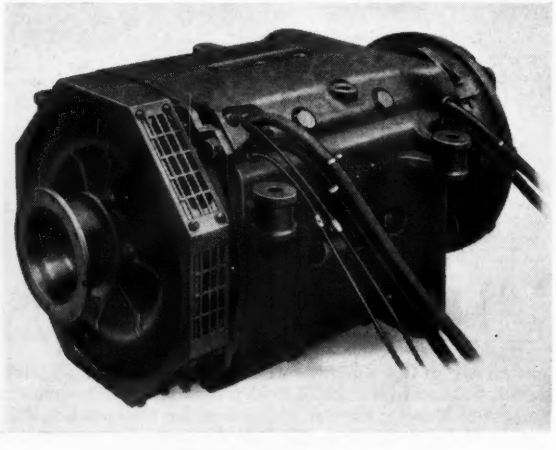
Modern trolley-bus

is fed by a small mercury-arc rectifier, it may happen that a bus commences to regenerate when alone on the section. Even with an over-voltage relay on each bus quite high voltages may be imposed on the line. One of the best methods of preventing the trouble is the use of an Ignitron loading panel at each sub-station. This utilises a valve-controlled circuit which responds instantly to the slightest voltage rise and inserts a loading resistance which absorbs the regenerated current.

When regeneration is definitely not required, various modifications of the compound-wound motor are being used. In order to permit the use of rheostatic braking a portion of the shunt field is retained but it is not sufficient to give any regeneration at normal speeds. The series field, which is stronger than on the full regenerative motor, is weakened in two or three steps to give the top speed. During rheostatic braking the series field is cut out entirely, the shunt field being limited to such a value as to keep the braking torque within safe limits.

Control Gear

Contactor control for trolley-buses came into use about 1922 and progress since then has been principally in the arrangement of contactor units to suit various control schemes. The



100-h.p. trolley-bus motor

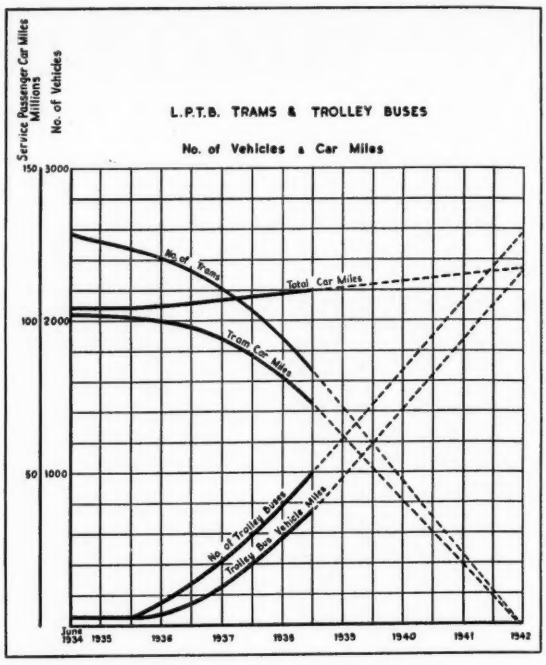


Fig. 3.—Number of vehicles and car miles

advantage of contactors lies in their flexibility, both electrically and mechanically, in meeting any requirements of motor control. Since the advent of regenerative control, smaller contactors have been developed for the shunt-field circuit as, even for the small field currents, it is found advisable to use contactors rather than to control the field directly from the master controller contacts.

For the most part, electro-magnetic contactors are still used although a few installations of electro-pneumatic control have been made. It is generally considered that the additional complication of electro-pneumatic control more than outweighs any slight advantage it may have in this particular application.

Probably the greatest progress has been made with the master controller which, on the early vehicles, consisted of a heavy drum-type controller operated through a gear quadrant attached to the driver's pedal. In 1931 the "scissors" type of controller was introduced, and this immediately reduced the weight of the controller to less than half. The "scissors" controller consists of an insulated bar carrying silver-tipped contacts which engage successively with similar contacts on a

Sunbeam-B.T.H. trolley-buses at Wolverhampton

fixed base as the bar is pivoted about one end. This type is used on a large number of the London buses.

The type of master controller now in general use is mounted in a common case with the rheostatic braking master controller and the reverser, which may have additional contacts for battery operating positions. When it is mounted in its usual position under the driver's seat, the two controller levers

are linked under the floor to the accelerating and braking pedals whilst the reverser lever is in a convenient position for operation by hand when the driver is seated.

Emergency battery operation, which at one time was looked upon as an unnecessary refinement, is now quite generally fitted and the additional mobility it provides has on many occasions proved of great value. The latest London buses have a 60-V 45-Ah battery which for normal purposes, when on charge and supplying lights, is connected to give 30 V.

Low-voltage lighting is now supplied as standard and may be provided either by a motor generator or a generator direct-coupled to, or belt-driven by, the traction motor. The direct-coupled generator is the more efficient and is also much quieter, but ample battery capacity is required as the generator cuts out at speeds below about 5 MPH.

During the last two years trolley-buses have increased at the rate of about 550 per annum, but this has chiefly been due to the large orders placed by London Transport. When the change-over of the London tramways has been completed the numbers will inevitably fall to a much lower annual figure, but at this stage it is impossible to make any forecast of that figure. There are at present a number of places, with powers to operate trolley-buses, where the old trams are still running. The thoroughness of the conversion in the London area has done much to assure those who were doubtful about the possibilities of the trolley-bus and, as the benefits of the change-over become more apparent, more operators will doubtless be persuaded to adopt this vehicle.

The maximum seating capacity of the largest bus now made is about 70 and it is doubtful whether, under the present weight restrictions, any increase in seating is likely apart from some revolutionary changes in the materials or methods of bus construction. It is interesting to note that in the U.S.A. double-deck buses are seldom if ever used and, even for busy city services, the single decker is found to be satisfactory. This is probably due to the absence of the limitation upon the number of standing passengers to five in any bus.

The trolley-bus already has the fastest acceleration of any public service vehicle and, on account of other traffic, there is unlikely to be much increase in this unless it be at the higher speeds to enable the maximum acceleration to be maintained for a longer period. The modern 100-HP motor has an overload capacity of 100 per cent. for short periods, so that during acceleration there is about 200 HP available, hence the superiority of the trolley-bus in this respect.

Automatic acceleration, which is commonly used on trolley-buses in the U.S.A. has, so far, not been considered necessary in this country. It has been found that the normal notching, under control of the driver, is quite satisfactory particularly as the shunt-field steps, with regenerative control, can be taken very quickly, the inherent lag of the field preventing any excessive current peak. Experiments are, however, being made with some types of automatic control.

Detailed improvements will always be possible, but the trolley-bus seems to have reached an established position where minor changes only are to be anticipated. Immense progress has been made during the last seventeen years and there need be no further reluctance on the part of any who have been wondering whether to give this essentially modern vehicle an opportunity of proving its worth.

Million-Volt X-Ray Tube

THERE has recently been installed at the Amsterdam Cancer Institute in Holland an X-ray therapy outfit of the Philips pumpless tube type which is capable of operating at a million volts. This equipment is claimed to enable the dose directed on to the patient to be made equivalent to the emanation from one kilogram of radium. Three patients can be treated at the same time, being adjusted exactly in the positions required with the help of a beam of light which is so directed that it simulates the focus of the X-ray beam at the spot to be irradiated.

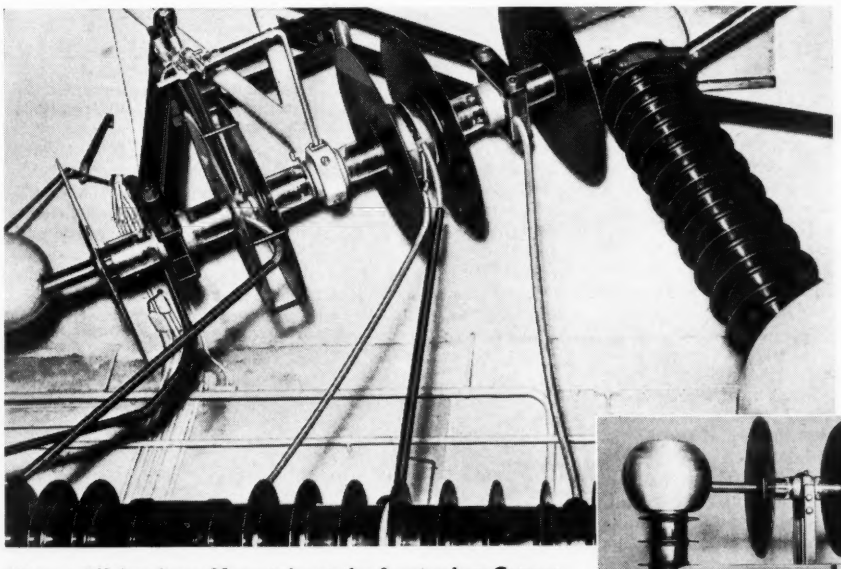
This Philips tube is said to be one of the first of its kind to operate without continuous evacuation. It is of the sealed-off type built on the cascade principle, and initially comprised several high-voltage sections, constructed on the double re-entrant principle, which are individually exhausted. The ends of the component tubes are provided with thin metal foils, and these are placed end to end, so that the whole assembly is welded together to form one tube. By means of an electron beam the metal foils are perforated and "communication" is established between the different component units, thus establishing one single X-ray tube having an overall length of only 2.40 metres.

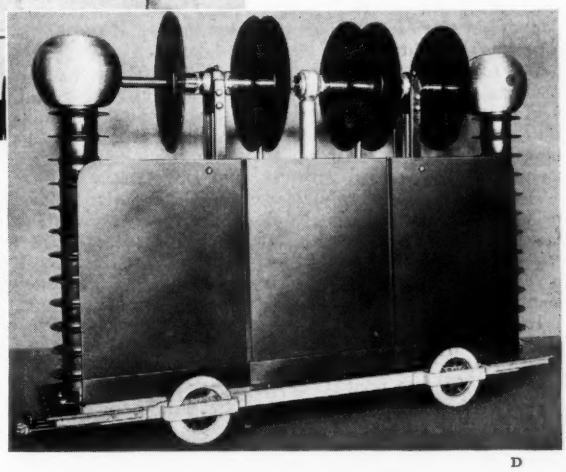
Any small amount of gas set free during the process is re-absorbed by a chemical agent provided inside the tube, and in this way the original high vacuum is re-established.

The unit operates with symmetrical tension, and to provide for stability in operation the tube is divided into six sections which are coupled to progressive steps on a high-voltage potentiometer resistance.

One of the accompanying pictures illustrates a tube as set up on a wheeled carriage for testing purposes in the works prior to delivery. The insulating column at each end supporting the tube contains oil-immersed potentiometer resistances from which voltages are tapped for the different parts of the tube. The other photograph is a view of the X-ray tube as set up in the hospital. The centre of the tube is earthed and suspended from the ceiling, while the first and third units are held by insulated supports; connections from the potentiometer resistance are also shown in the picture.

The high-voltage generator comprises a condenser and rectifier stack built on the well-known Philips principle. Two familiar examples of this are the equipments in use at Cambridge University for operation at 1,250,000 and 2,000,000 V respectively.





Above: High-voltage X-ray tube at the Amsterdam Cancer Institute. Right: Tube mounted on a wheeled carriage for testing purposes

TRANSMISSION LINES

The Importance of Equivalent Span

By J. L. Gaved

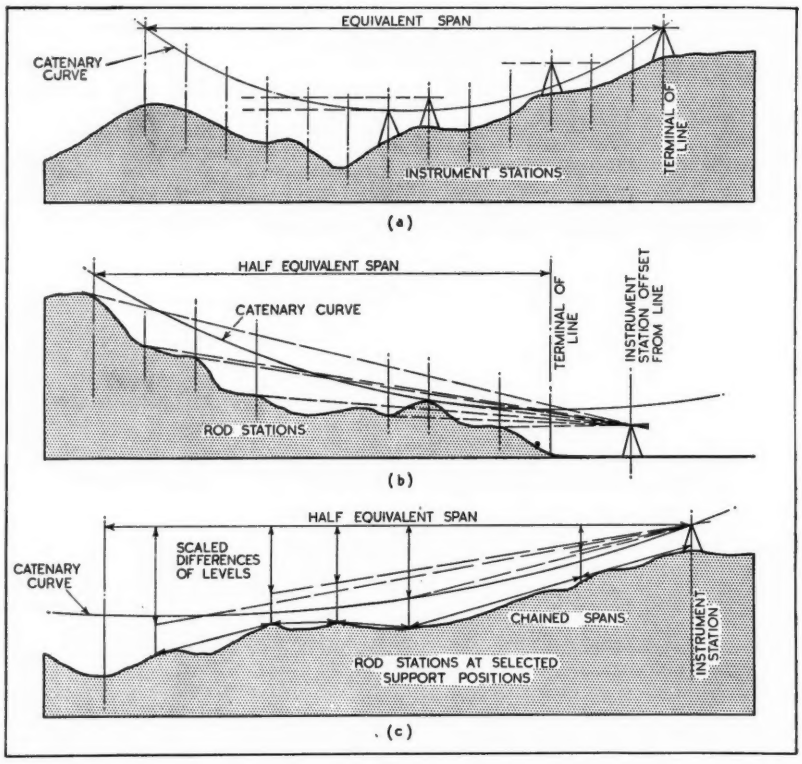
IN order to obtain equal loading on every support of an overhead line it would be necessary to maintain the insulators at a dead level throughout its length. This is an economic impossibility in many districts owing to severe changes of contours. Under such conditions the best construction that can be achieved is based on the equivalent span, which eliminates the probability of negative loading on a number of supports. It is a compromise at its best, since it does not secure equalisation and perforce underloads and overloads supports according to their respective positions, but it does ensure correct ground clearance with a positive loading on each support, together with appropriate positions for their most economical heights.

The equivalent span is, therefore, important and is best described as the horizontal distance between those two supports which are located at points of equal altitude, having a number of other supports between them at lower levels. The catenary curve of a conductor at the correct tension suspended between the two principals should then rest on the insulator of each intermediate and exert a positive load thereon.

It is not unusual for an overhead line, or a section of it, to extend not from one high level to another of equal altitude but to terminate at a low level. In this event one support of the equivalent span alone exists, the other being an imaginary one which is inserted on the completed profile of the line route to produce the requisite conditions.

Equivalent spans, frequently a number of them, can be determined only with this complete profile of the entire line route available, which indicates the highest and lowest points within the respective sections, because unless the equivalent spans are revealed as natural, a rare occurrence, they must be made, graphically. In the case of a line which terminates at a low level the equivalent span becomes twice the horizontal distance between that point and its highest level.

Since the utility of the equivalent span relies upon the profile, it is to the latter that we should give earnest attention in the first instance so that the consequent loading and height of individual supports shall be accurately determined.



Methods employed to secure profile data: (a) Difference of levels determined by direct readings. (b) Tangents of vertical angles indicate heights, and stadia readings represent distances. (c) Graphical method

Securing Profile Data

Three methods are employed to secure profile data. In the first, diagram (a), the difference of levels is determined by direct readings of the staff, using a dumpy level. This is orthodox and in this particular article serves the useful purpose of a contrast to the two other methods.

The second method, diagram (b), is to establish angular readings of an "instrument height" mark on a plain rod, held at support positions or high-spots, when the theodolite is stationed at some point to one side of the line route. This procedure circumvents large obstacles, providing the instrument station is selected with care and judgment.

Tangents of the vertical angles indicate heights, and stadia readings represent horizontal distances. These require a certain amount of simple arithmetic and reference to mathematical tables in their translation. In all respects this method is reliable in proportion to the care taken to locate the instrument station on the Ordnance map or enlargement therefrom.

The third method, diagram (c), is to obtain angular readings of an "instrument height" mark on a plain rod held at support positions or high-spots when the theodolite is stationed at a prominent support position in the line.

This method provides the facility for scanning a complete section or line situated in undulating country over which an unobstructed panoramic view is available. It is purely graphical in translation, differences of levels being scaled off direct from the level sight-line of the instrument and the angular sight-line. There are no calculations to be made, while the hollows close to support positions or between high-spots are rightly ignored as irrelevant because economical construction employs the latter so far as is possible.

Where low and level ground intervening is of such an extent as to exceed the desired span length between supports, then sight-lines to selected positions on this level ground are equally translatable as the high spots. All lengths are chained along the ground and in general closely approximate to the projected horizontal, but if extreme accuracy is required stadia readings must be recorded.

This brief treatment of a most fascinating subject might conclude with decided emphasis being laid on the desirability of consistently careful observations with the instruments which in the case of the theodolite should be equipped with a vernier scale giving angular readings to at least 15 seconds of arc. Results will then yield every satisfaction.

V.D.E. Conference

AT the technical meetings of the V.D.E. held in Vienna recently the subjects under discussion were electrical communications, measurements, heating, switchgear and installations, power stations, industrial applications, railways and illuminations, The V.D.E. has for many years been renowned for the thoroughness of the periodic reviews which it makes of German electro-technical progress, and it appears that the high standard was maintained this year.

The programme shows that the technical problems encountered in Germany are similar to those with which we in Great Britain are also familiar. But it is clear that German technicians have supplementary problems to solve due to shortages of raw materials, which we have not yet encountered. It is of much interest to note that a sub-section dealt specially with electrical aspects of air transport. Some 3,000 representatives of the German electrical engineering profession took part in the meetings.

Motor Survey—IV

Enclosures and Ventilation

Influence Upon Rating

THE following comments by Mr. Stay (E.C.C.) indicate how necessary it is to give adequate consideration to the conditions under which a motor will run when selecting the type of enclosure for it. Where there is reasonably clean and secure housing for pump and compressor drives the screen-protected motor will suit the majority of cases. Similarly the same type of motor will do for rolling mills providing the motor can be housed separately with its drive through a wall, but if it is situated actually in the mill house then an enclosed machine should be employed.

Apart from broad classifications of motors with regard to types of enclosure as laid down in B.S.S. 168, new applications and fresh ideas with regard to old ones are constantly calling for modifications to every class

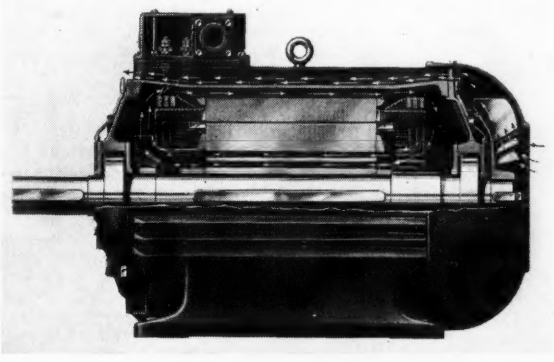
Enclosed motors are desirable in cement works, while for the driving of grinders (logs) in paper mills enclosed motors (slip-ring or synchronous induction up to 2,000 HP) should be used and fed with clean air. For the normal driving of circulating pumps of the vertical type the screen-protected motor with a cowl on the top as protection against dripping water is a reasonable proposition.

For operation in the tropics a fine-mesh screen is a very desirable protection against the ingress of insects, but such a practice is to be deprecated in the cotton mill where the mesh gets quickly covered with fluff and the motor becomes virtually an enclosed machine. Mr. Stay also stressed the need for further education on the enclosure question for dirty industries, as also did Mr. Bailey (Bruce Peebles), who pointed out that a misplaced ventilated motor in a dusty atmosphere often resulted in clogging up with consequent loss of output for six months or so.

The most widespread development of recent years has been the introduction and rapidly growing use of the totally-enclosed fan-cooled motor. As Mr. Smith (Fuller Electrical) pointed out, this motor was born out of the limitations of the straight totally-enclosed motor which has many advantages over other types, particularly with regard to reliability and robustness, although its necessarily greater active material taxes the normal facilities for the dissipation of heat.

The straight totally-enclosed unit still finds considerable favour, in the smaller sizes at any rate, and Mr. Green (Horace Green & Co., Ltd.) said that he would advocate the totally-enclosed non-cooled motor against the fan-cooled motor unconditionally on the score of reliability. Mr. Bailey thinks that the fan-cooled motor is the driving unit of the future for general-purpose work, largely because of the fact that in the majority of cases the motor can be installed close to the job —actually at the working face in quarries, for instance—without regard to local conditions.

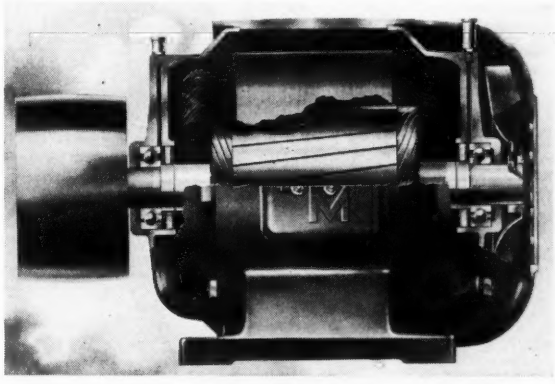
There is a good deal of misunderstanding among users regarding the influence of enclosures on output, and the following comments made by two manufacturers' representatives will show how vitally necessary it is to consider local conditions every time. The first of these gentlemen said that the fan-cooled unit might have from 30 to 40 per cent. greater output than the straight enclosed motor, but that it might have an output of only 50 to 60 per cent. of the protected ventilated type of motor in certain positions and conditions.



Smaller fan-cooled motors have proved so popular that the principle has been extended to the "Thru-Draft" motors for larger outputs; the cooling system of a "Thru-Draft" (Bruce Peebles) motor

The other said that in certain cases it had been found that the output of a fan-cooled motor was greater than that of a screened motor of the same frame size. He also considered that it was certainly a little more expensive in the first place, but it was an economical proposition on the score of performance and extra protection, and the Bruce Peebles range of smaller units has proved so popular that the principle has been extended to the "Thru-Draft" motors for larger outputs. The rotor fan propels the air through the rotor, then over the end windings and through V-shaped vents situated along the back of the stator core. The stator frame has wide annular spaces formed on its outer periphery by the projecting vents and the frame covers which are swept by air drawn in by an external fan located at the non-driving end.

Fixing the fan at the pulley end is deprecated because, it is said, troubles arise from greater shaft deflection and grease. A new totally-enclosed fan-cooled motor by Mawdsleys has two fans, one inside and one outside, and they are usually both at one end. The internal fan circulates air through channels in the frame and the external fan, under an end cowl, blows air over ducts. The cooling system of the



Newman Industries strongly advocate one motor for all purposes; the cooling arrangements of a Newman totally-enclosed fan-cooled motor

"Witton" totally-enclosed fan-cooled motors involves the use of a double-wall casting, the space between the walls being divided into ventilation ducts by ribs. The inside of the inner wall is bored out to hold the stator stampings and in the centre of the shell almost the entire surface of the back of the stampings is exposed to the air flowing through the ducts.

Referring to the "Emcol" motor, Mr. Barfield said that the cooling system should be designed to prevent hot spots and permit the fullest use of active material. In the larger sizes additional cooling of the stator pack is provided for by by-passing some of the external cooling air through circular passages in the iron and this assists cooling in the region of the coils overhang.

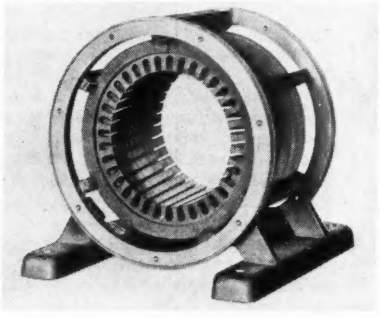
Evolution of Fan-cooled Motor

The historical aspect of the development of the fan-cooled motor is a fascinating story, but our object in publishing the following notes on Lancashire Dynamo activities is mainly on account of their value to users by the revelation of the "snags." The first development was a motor with a radiator in the bedplate. The motor's own fan blew air up every alternate section and an external fan supplied every other alternate section, thus cooling the machine on the contraflow principle.

It was found that the air-flow path was too easy, so that the next development was a radiator with elliptical tubes through the inside of which the external air passed, the internal air passing along the outside. This scheme increased the output, but the deep bedplates, the considerable cost in small sizes and the fact that the construction did not readily

adjust itself to the vertical motor were regarded as disadvantages. A development from the closed-air-circuit equipment is to-day's "Corcooled" motor in which the cooling air blows directly on the back of the machine. This construction is easily adaptable to vertical macines in which dirty air is not blown through the tubes and the dimensions compare favourably with ventilated machines.

Perhaps the strongest advocates of the fan-cooled motor are Newman Industries, Ltd., who recommend one motor for all purposes. In one part of a large factory conditions are dry and clean and so the open protected machine is used; in another part the air is dusty and one sees therefore the screen-protected motor; elsewhere grinding operations are going on and so a pipe-ventilated or totally-enclosed motor is installed. Another part is very damp so a totally enclosed motor is used. Mr. Hedley Newton claimed that the Newman motor had been designed to give the maximum convenience to the user by meeting any or all of these conditions. It is slightly smaller in overall size than the open-type motor, owing to the fact that the cooling air makes direct contact with the laminations. An N.P.L. report of a test of a 1-HP motor shows that at full load the temperature rise was 22 deg. C. and at 1¼ times full load it was 34 deg. C.



All-steel construction is often a successful means of reducing the size of a motor; the frame of the all-steel A.E.G. motor designed to meet difficulties with foreign machine tools

There are, however, limits to the use of the fan-cooled motor and to quote two of them Mr. Richards (Higgs Motors) pointed out that on a polishing machine the fan would probably draw abrasives into the machine, while in an air-conditioned room it could easily upset the conditions aimed at. The E.C.C. maintained that the fan should not be employed for very large motors.

Compromise is called for in many directions in motor design and it seems that such may be the case with the new "High Efficiency" motor of the Harland Engineering Co., Ltd., special features of which are more active material to reduce magnetic and current densities and less ventilation as the result of lower losses.

Cooling and Design

Mr. Hoseason (Met.-Vick) said that motor design without either an incorporated or separate fan necessitated a compromise between the ideal rotor diameter for electrical performance and the necessary diameter for the fanning action. With a fan it is possible to draw up the electrical design without any restrictions consequent upon the necessity of obtaining sufficient air flow for heat dissipation. He stressed the need for arranging the air flow with a minimum number of changes of direction, because particles of dust continued in their direction of flow and accumulated on the surface opposite the point of change of direction on account of their moment of inertia.

The Brush totally enclosed fan-cooled motor of the double-frame type has a special cleaning feature in the end frame. Dust is trapped inside the end frame whence it falls into a cavity and is caught in a current of air which expels it from the machine through an outlet arranged at the bottom of the end shield.

The pipe-ventilation method of cooling has always been somewhat restricted because of the cost of the trunking and the valuable factory space this often occupies, and we should say that the fan-cooled motor has still further limited its sphere of activity. Bruce Peebles suggested that the pipe-ventilated motor was probably a cheaper proposition than the totally enclosed motor for sizes, say, above 100 HP, but many customers object to trunking in any case and a poor lay-out of trunking can easily restrict the volume of air required for cooling the motor.

Flame-proof requirements have probably exerted the biggest influence, to take the broad view, on motor enclosures because they were directly responsible for the introduction of the totally enclosed motor—of any size at any rate. For many years and until recently the flame-proof motor has been used exclusively in the coal mine, but now its application has been extended, to quote Mather & Platt, to water-proofing factories, chemical and fertiliser works, cellulose spraying plants, printing works where inks with explosive dyes are employed (flame-proof motor pumps convey the ink on to the pads) and petrol stations.

It is probable that an explosion of petrol vapour will be rather more severe and penetrating in its effect than one of firedamp, and flame-proof motors to meet these conditions must, therefore, be constructed to a somewhat more stringent specification than that for colliery motors.

In a way the production of flame-proof motors is much simpler than the production of some other types in that the problem really resolves itself into meeting a specification, and bearing on this point it was very encouraging to hear from many manufacturers of the helpful collaboration of the Mines Department.

It was suggested to us that in the main the tendency was towards a general tightening up of the regulations governing the use of flame-proof motors and that generally the collieries were as keen on this as the Mines Department so as to reduce accidents to a minimum.

Three sets of conditions are so far drawn up for flame-proof equipment. The first covers methane (coal mines), the second pentane (petroleum and acetone vapours) and the third town and coke-oven gas. The Buxton testing station will issue certificates for motors for the first two groups, but not for the last, although it will test motors in this respect and report upon them.

Flameproof Features

According to Lancashire Dynamo & Crypto, the essential features of the flame-proof motor are that the flanges shall be not less than one inch wide, that sufficient bolts and screws shall be employed to hold parts together under explosion conditions, and that all the castings shall withstand a force of 150 lb. per sq. in. Squirrel-cage flame-proof motors are produced by the G.E.C. in ribbed and barrel types, the latter being designed for easy transportation underground in that they can be rolled along the road.

Many of the modern developments in motor enclosures are designed to enable them to withstand the rough usage to which they are subjected. An important departure in production is fabrication. Mr. Hoseason expressed the opinion that fabrication from the point of view of economy in production is only effective for machines more than about 5 ft. in diameter. A distinctive feature of, for example, B.T.H. large induction motors is the fabricated steel construction of great strength and rigidity, and along these lines we saw some impressive large pump and other motors in the Harland workshops at Alloa.

The Bruce Peebles "Steel-clad" motor which has been developed to meet the demands for applications rather too severe for the general purpose motor (crushing and hauling in quarries, for instance) and the "Heavy Duty" motors of the same make which have been produced to meet those conditions in steelworks, for example, which are not severe enough for the usual type of steelworks motor but too severe for an ordinary industrial machine are both excellent examples of all-steel fabricated construction.

All-steel construction, by virtue of its greater strength, is often a successful means of reducing the size of a motor as in the case of B.T.H. DC crane motors and the new A.E.G. steel motors which have been developed primarily to meet difficulties in supplying motors small enough for certain foreign machine tools. Metropolitan-Vickers told us that the oil companies were calling for motors up to 150 HP and as they did not want boiler-plate special cast-frames were produced.

Protection from Water

Dairy conditions are responsible for considerable modifications in motor enclosures to ensure that the windings do not suffer from the daily hosings of the floors. One Brush type has removable metal louvres at the openings for easy inspection and another has large cowls vertically arranged on the end brackets.

Crompton Parkinson told us that they had found that their weatherproof DC machine was unsuitable for the dairy and that they had therefore evolved a machine which was totally enclosed and watertight. The ordinary totally enclosed motor is not watertight nor even weatherproof. A development from this motor is the "Deluge-proof" motor which is ventilated by small openings situated near the floor at the bottom of side cowls.

Limited dimensions often seriously affect motor enclosure and this is the case with Tuscan petrol pump motors for which the general length allowed is 10½ in. overall (¾ HP, long period) and also the submersible pump of James Beresford & Son, Ltd., which has a motor of about 7⅞ in. diameter (25 HP) to go into an 8 in. bore hole.

THE RADIO EXHIBITION

By W. E. Miller, B.A.(Cantab), M.I.W.T.

DESPITE the fact that the opening of this year's Radiolympia coincided with the beginning of the international crisis, the attendance at the time of writing, though somewhat lower than that of last year's show, is much higher than one would expect in the circumstances.

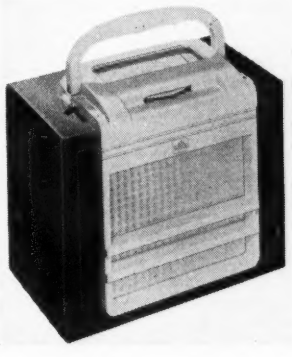
The general impression is that the exhibition is one of the best of the series, both in appearance and interest, and in happier circumstances it might well have had more visitors than any of recent years. The Radio Manufacturers' Association (organisers of the exhibition) and the various concerns represented are to be congratulated on the results of their efforts, in the face of very serious difficulties.

The radio receiver exhibits cover an extraordinarily wide gamut of requirements. At one end of the price range we find an AC/DC midget transportable set at £4 17s. 6d. (Invicta); at the other end there are luxury receivers costing between £100 and £200 by Dynatron Radio, Keates - Hacker, McMurdo Silver and R. G. D.

Moderately priced console receivers are a feature of the exhibition. This Ekco model incorporates motor-driven automatic tuning, and is priced at 15½ guineas

The bulk of the exhibits, however, fall in a price class from about £8 to £12 and there are literally hundreds of these to choose from. Most incorporate automatic tuning, either mechanical, pre-set or motor-operated, and for the most part they follow fairly conventional lines.

Most of the receivers employ superheterodyne circuits, the simplest ones incorporating merely a frequency-changer stage, an i.f. stage, demodulation and automatic volume control, and an output stage usually employing a single pentode or tetrode. There is, however, a noticeable tendency to improve on this specification, except in the lowest priced sets. For instance, many models employ a stage of r.f. amplification preceding the frequency-changer; variable selectivity is incorporated in the i.f. portions of many receivers, while special tone compensating or tone control circuits are popular. It is also a notable point that the output stages of many receivers employ two pentodes or tetrodes in a push - pull arrangement, designed to give an increased power output and greater freedom from harmonic distortion. The latter is also achieved in many models by the incorporation of inverse feed-back circuits.



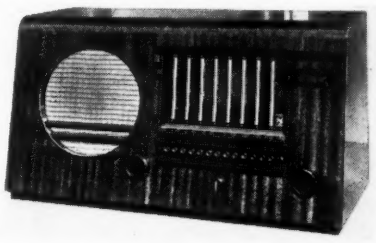
A modern lightweight battery portable receiver, this "His Master's Voice" model 1402 is priced at 8 guineas

Loud speakers are all of the moving-coil type, and have been improved in detail points, but otherwise show little change, with one or two exceptions. One of these is the special high-fidelity model by Goodmans Industries, which has an unusual form of suspension, and is designed for use in a special box-baffle.

Cabinet work this year is extremely good on the whole. Both wooden and moulded cabinets are to be seen, but there is a notable absence of bizarre and unconventional types. Radio receivers are no longer disguised to any appreciable extent as cocktail cabinets or occasional tables. Console models seem to be popular, and in many cases are very reasonably priced. There is also a large variety of inexpensive radio-gramophones, and for £20 or so quite excellent models can be seen.

Remote control does not appear to have achieved any great popularity. In certain of the Murphy models it is an optional feature, R.G.D. fit it to one of their radio-gramophones, while Philco has the "mystery control" receiver, which employs a small unit with no connections between it and the receiver for transmitting control impulses.

For operating AC receivers from DC mains several makers show vibratory convertor units, notably Philips, Mullard and G.E.C. Such convertors are also shown by A.F. Bulgin and Masteradio.



Unusual features of this Pye "International" receiver, are that eight wavebands are provided, the s.w. range of 13-49 metres being split up into six bands. The price is 16½ guineas

Car radio receivers are shown on a number of stands this year, and prices on the whole are much lower. Some models incorporate automatic tuning for several stations, which is a particularly useful feature of this type.

Television receivers are, of course, shown by the majority of set manufacturers. They range in price from about 22 guineas for an "add-on" unit giving vision (7-in. tube), and with provision for using an ordinary receiver for the sound, to £175 for the Scophony mechanical-optical receiver, with a 14 in. by 20 in. picture. For about £40 one obtains a receiver with a 10 in. by 8 in. picture, while for about £50 the same model with the addition of a good all-wave radio receiver is available. Most manufacturers have models in this class, while another popular type is a console with a 7½ in. by 6 in. picture at about 32 to 35 guineas.

Table radio-gramophones, as exemplified by this McMichael model, are popular. A 3-band radio receiver is incorporated, and the price is £14 17s. 6d.

With very few exceptions, modern receivers employ magnetically scanned and focused cathode-ray tubes. Improvements since last year are in the direction of greater stability of synchronisation, improved interlacing, simplification of the controls, and greater picture detail.

Some of the manufacturers of television equipment, for example, Philips, Mullard and Baird, are able to reduce the total number of valves used on their sets by employing electron multipliers in certain stages.

The Augetron multi-stage electron multiplier, shown by Vacuum-Science Products, is a particularly interesting device, using the phenomenon of secondary emission in no fewer than six stages. The use of such high gain valves may well

open up new avenues in receiver design. Another feature of this year's show is the attention which is obviously being paid to aerial design, both for television and ordinary receivers. The developments are mostly directed towards the reduction of interference. For ordinary sound receivers the "spike" type of aerial, suitably matched to the receiver seems popular. Concerns such as Aerialite, Antiference, and Belling-Lee show these aerials, while television aerials are also to be seen on their stands, as well as those of Baird, Bulgin, Eastick, E.M.I. Service, G.E.C., and others.

Several stands are showing interference suppressors, notably Belling-Lee, British Insulated Cables, Bulgin, Dubilier, and T.C.C. Components for manufacturers and service engineers are also shown by many of the well-known component firms. Most of the valve manufacturers are represented, and in addition to the latest types of receiving valves (including low-consumption 1.4-V types for operation from dry l.t. batteries) are showing also cathode-ray tubes. Edison Swan have a number of "Mazda" tubes operating on their stand, together with some fluorescent displays activated by ultra-violet radiation.

Batteries, battery charging plant and emergency lighting sets for A.R.P. are shown by a number of concerns, an interesting new introduction being the Varley dry accumulator, a solid 2 V cell with no free acid or jelly which is rechargeable in the usual way.

Westinghouse, apart from their charging plant, are showing examples of their metal rectifier units for all purposes, including high-voltage, low-current types for television tube h.t. supply. Instruments and service and production test gear are prominent on the stands of Cossor, E.M.I. Service, Marconi-Ekco, Mullard, Norman Rose and Taylor Electrical.

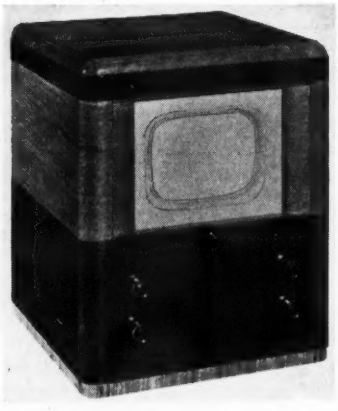
One of the first Philips domestic television console receivers, model 2412, incorporates a 9-in. tube, and has an all-wave radio chassis with press-button tuning. The price is 45 guineas

Among the unusual exhibits may be mentioned the electro-encephalograph which is on the Edison Swan stand. It is a medical instrument for recording brain activity, designed by a well-known physiologist, and manufactured by the Edison Swan Co.

Another novel exhibit is staged by Standard Telephones and Cables, Ltd. It is a scale model town designed to demonstrate the company's equipment for the remote control of street lighting, A.R.P. services and off-peak load. The demonstration shows how the whole of a town's lighting can be press-button controlled, or how sirens can be operated, and fire brigades, A.R.P. wardens, &c., warned in times of emergency.

The system operates by injecting low-voltage DC impulses into the AC supply mains, which will operate suitable relays connected at any other points in the supply. Already more than thirty boroughs and electricity undertakings have adopted this system.

The Army, Navy and Air Force are adding an (unfortunately) topical interest to the show this year, with exhibits of apparatus as used on active service. The Army's stand, camouflaged with grass and hedges, shows three self-contained mobile wireless stations.



A television "add-on" unit by the General Electric Co., Ltd. Priced at 22 guineas, it provides vision and the first stage of the sound reception, which is fed to an ordinary radio receiver

Each has a special purpose and is equipped with appropriate power for its job; the largest is capable of dissipating 1.5 kW in its output stage. The lightest service "transceiver" is shown here.

The Navy has a similar outfit, working on c.w. only, for use by landing parties who wish to keep in touch with their ship. A feature here is provision for remote control, so that the equipment could be camouflaged and hidden away. The remaining equipment on this stand is that of the wireless cabin in a modern destroyer.

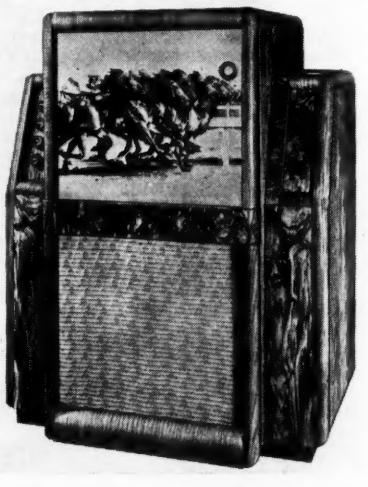
The Royal Air Force stand is interesting, both from the point of view of the radio enthusiast and the general public. The nucleus of the radio section is the transmitter, with its accompanying receiver, as fitted in the cockpit of the modern small R.A.F. aeroplane. The Link trainer is also shown, and it is attracting much attention.

As usual, the B.B.C. and G.P.O. are well represented. On one of the B.B.C. stands are shown the impressive outside broadcast sound recording van; one of the mobile television vans with extending aerial; a field-strength measuring van; a mobile film television recording unit, which takes films at such times and places as are inconvenient for direct transmission, so that they may be used in a subsequent programme; and the famous Boat Race transmitter.

Prominent features of the G.P.O. stand are the ship-to-shore telephone equipment and the ultra-short-wave beam transmitters and receivers, which are used for communication between the mainland and neighbouring islands. Micro-wave transmission and reception within the confines of the stand are also demonstrated.

Occupying a large area in the Grand Hall Annexe, the model factory is a feature new to Radiolympia, and one which is attracting great interest. It is a "live" exhibit, that is, machines are running and operatives are actually carrying out a large number of manufacturing processes. The central exhibit is a long revolving eight-sided drum, on successive faces of which are mounted receiver chassis in progressive stages of assembly. Chassis by the following concerns are shown: Alba, Bush, Cossor, Decca, Ekco, Ferranti, G.E.C., H.M.V., McMichael, Marconiphone, Murphy, Philco, Pye, R.G.D. and Ultra.

Among the specialised "working" exhibits are the following: Receiver wiring (Murphy); litz wire covering (Scott Insulated Wire); engraving (McMichael); condenser ganging and testing (Plessey); coil manufacture (Alba, Cossor, Decca, Ferranti, H.M.V., Marconiphone); production coil testing (Marconi-Ekco); riveting and assembly (H.M.V. and Marconiphone); use of television frequency modulated oscillator (Pye); magnetometer (Pye); valve manufacturing processes (Cossor); condenser end-cap spinning and wire forming (T.C.C.); spot welding (Ekco); and variable condenser testing (Philips). In addition, Vidor have an exhibit showing stages in the manufacture of dry batteries.



This Scophony mechanical-optical television receiver has a 24 in. by 20 in. screen, and its price is £175

It will be realised that with all these interesting features, Radiolympia this year is far from being a "dead" show of radio receivers, and this largely accounts for its comparative success in the face of the political situation.

Television Convention

This year a number of technical and trade conventions have been organised, the first one taking place on August 24th. This was the R.M.A. Television Convention, and the speakers were Mr. J. H. Thomas, chairman of the R.M.A.; Dr. E. V.

Appleton, of the Television Advisory Committee; Sir Stephen Tallents, B.B.C. Controller of Public Relations; Sir Noel Ashbridge, B.B.C. Chief Engineer, and member of the Television Advisory Committee; and Mr. C. O. Stanley, chairman of the R.M.A. Television Development Sub-Committee.

Mr. Thomas, in opening the convention, expressed his appreciation of the development work and the improvement in the television programmes which had taken place since last year.

Dr. Appleton said that during the short time he had been a member of the Television Advisory Committee they had had to review the whole television situation, to consider what should be the next step to extend the service to other parts of the country and to assist the television industry in its sales of television apparatus. A report which had been submitted to the Postmaster-General was under careful consideration. Unfortunately, it was not possible to reveal what the recommendations had been, but it was permissible to say that it had never been suggested that there should be separate programmes originating at each provincial station, which would be far too costly.

What had been considered was the means available for relaying from a network of stations a programme originating at one station. Two methods were available, the cable and the ultra-short-wave radio link. Both had their special advantages, which had been carefully studied. It had also been necessary to consider all the possible sources of finance for an extension of television to the provinces.

Dr. Appleton thought that the response of people in the London area to the fine service which existed was disappointing. There were probably two factors contributing to this—the fear that sets would get out of date quickly or that the service would stop or be altered, and the thought that sets would get cheaper. The London station was a stable one for years to come; the question of receiver costs lay with the manufacturers.

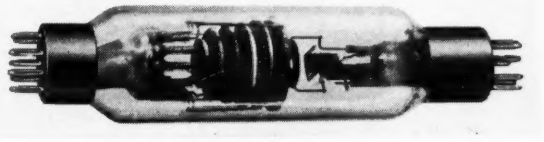
A low-priced single-unit car radio receiver, operating on the m.w. band only. It is the Philco C5, prices at 10 gns., and distributed by Delco-Remy & Hyatt, Ltd.

The Government believed that in television there was the germ of a great national industry, and the Television Advisory Committee was determined to bring that about. The B.B.C. and the electrical industry had enabled us to lead the world in technical matters and in programmes.

Sir Stephen Tallents said that the B.B.C. was indebted to the R.M.A. sub-committee and to dealers for all the work which had been done as part of the extension campaign. The B.B.C. felt that television was something which would revolutionise the whole entertainment world.

Sir Noel Ashbridge devoted his speech to a review of the improvements in the television service during the past year. One extra studio had been added, which had improved conditions at Alexandra Palace. A central control room had been installed, and this had resulted in smoother presentation of the programmes. The Emitron cameras had been improved, due to the efforts of the Marconi-E.M.I. laboratories, while considerable progress in the study of studio lighting for television had been made. Dealing with outside broadcasts, he said that a great deal of progress had been made.

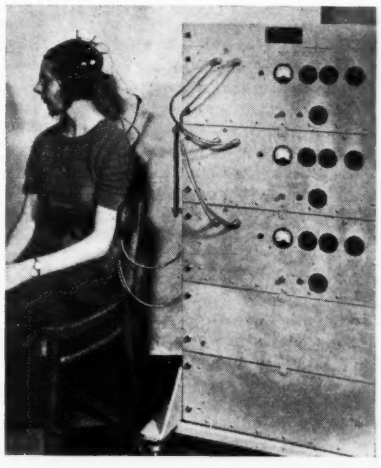
Sir Noel revealed that it was now possible to transmit outside broadcast material on ordinary telephone lines up to a distance of four miles, for linking up to a transmitter or to the special television cable. With regard to the extension of television to the provinces, the problems of linking had been studied, and no technical difficulty was holding up the extension.



The Augetron, a 6-stage electron multiplier, shown by Vacuum-Science Products, Ltd.

The range of the Alexandra Palace transmitter had been found to be greater than the anticipated 25 miles, and the service area was now up to about 35 miles from the station. Were it not for motor car interference, the range would be much greater. Receivers, Sir Noel said, were reliable, but was the public aware of this? There was no more trouble than with ordinary sound receivers, and the tuning adjustments were probably even easier. He thought that the public should be educated to these facts.

Mr. C. O. Stanley then followed with a vigorous and outspoken speech. Referring to the anxious political atmosphere in which the convention was being held, he said that if as a country we were going to be involved in a war we had immense scientific resources which would play their part. Television dealers, as pioneers of a new scientific achievement, might feel that they had contributed in some measure to these resources.



Part of the electro-encephalograph equipment exhibited by the Edison Swan Electric Co., Ltd. It shows the pad electrodes and the amplifying unit, the output of which is taken to a recording unit

Twelve months ago, he went on, the sub-committee was told that the interest in television was so poor that it might even be necessary to stop the service entirely. So the sub-committee launched a drive to sell 15,000 television sets. That figure had now been exceeded and they felt they could at least expect a start on the extension of the service to the provinces. The need was vital in order to convince the public that the service had progressed beyond the experimental stage. Referring to the future, he set the next goal before dealers as the sale of another 40,000 sets in the next six months.

A sensation was caused when Mr. Stanley, saying that he did not think that lack of finance was the primary cause of the hold-up of provincial television, stated: "I blame the G.P.O. entirely for the lack of television development during the last eighteen months."

Turning to the subject of interference, he read a statement from Major Peter, chairman of the R.M.A. sub-committee on this subject. The chief points in this statement were that excellent progress had been made, although the Postmaster-General was not yet in a position to introduce legislation; that the R.M.A. had agreed with the British Standards Institution regarding specifications for interference-free apparatus; that a pamphlet on this subject was in preparation; and that dealers should fit suppressors to their own motor vehicles and only sell equipment which did not cause interference.

Progress in Glasgow

AN increase of 10 per cent. in the amount of electricity sold in Glasgow during the year ended May 31st is recorded in the annual accounts of the Corporation Electricity Department. This rate compares favourably with the increases reported by other large undertakings, and was principally due to rapid expansion in residential supplies, with commercial utilisation also making good headway as shown in the following analysis:—

	Million kWh. sold	Per cent. increase	Average price received 1937-38	Average price received 1938-39
Residential	124.2	17.5	0.75d.	0.72d.
Commercial	138.8	13.2	1.14d.	1.08d.
Industrial	224.3	4.6	0.58d.	0.58d.
Street and stair lighting	16.6	7.0	0.66d.	0.67d.
	503.9	10.0	0.77d.	0.75d.

The supply demanded during the year for new services was 30,000 kW and the number of consumers rose by 12,607 to 202,988. The showrooms made an important contribution to development, and the Department's policy of canvassing all new houses has resulted in the "all-electric" home becoming more general. Efforts are continually being made to induce the Education Department to install electrical appliances in the domestic science sections of all schools.

The gross revenue of the Department rose from £1,499,382 to £1,616,115, with an increase of working expenditure from £843,128 to £925,198. The surplus on the year's working was £178,402 (compared with £173,816 in the previous year), of which £118,247 was applied for capital purposes.

I.E.E. Regulations—IV

CABLES AND WIRING SYSTEMS

By H. R. Taunton, A.M.I.E.E.

SECTIONS 3 and 4 of the I.E.E. Regulations, dealing with the installing of cables and conductors, occupy in the new edition about six pages more than in the old. To those of us who are not lawyers, but simple men who like facts without verbiage, this is a retrograde step; unnecessary, too, as will be seen as we read through them.

Rule 301 is amended, as are other rules, to meet the development of mineral-insulated copper-sheathed cables; and the words "except, if desired, as regards the size of conductor" have been added. What do they mean? The size of conductor is the key to Tables 4, 13 and 14. If the phrase is intended to cover the possibility of sizes not mentioned in them, then the reference to them, and the whole rule, becomes pointless.

The word "weight" in the note, and in the heading of Table 4, is a slight slip, since the column giving weights has now been omitted. Otherwise the table is as before, with the omission of certain sizes, notably, 1/.036 and 1/.064, to conform with Rule 306. Tables 13 and 14 omit the column giving the resistance of plain wires; and in 13 certain sizes have also been omitted. Note in this table the increased current ratings, of 20 per cent. or more.

Increased Current Ratings

The opening clause of Rule 302 refers to the remaining tables giving current ratings. These are all increased, and the circuit lengths for standard voltage drop, of course, correspondingly decreased. In all these new tables, too, the ambient air temperature has been taken as 90 deg. F. instead of 100 deg. Otherwise, except again for the omission of certain sizes, they tally with the corresponding tables in the 10th edition.

The clause in the old rule dealing with diversity factor has been dropped—but see Rule 303. Clause B deals with mineral-insulated copper-sheathed cables, and is, of course, new. The appropriate tables are those for lead-covered paper cables. Clauses C and D cover the old Rule 303. Table 16 referred to is the same as the old Table 20, with a slight reduction of the current rating of the 1-in. size on DC.

Rule 303 replaces the old 4B,C and 302A,B. Its important point is that it now covers final sub-circuits. The wording is a little quaint: it amounts to "a diversity factor may be applied . . . . provided that . . . . [it is applicable]." The first paragraph of the note is new, and the last two lines of it certainly noteworthy. Table 1 referred to is as before, but the preamble has a useful addition, a warning that the values given are not to be taken as cumulative, e.g., in the case of a block of flats.

Rule 304 (voltage drop) is practically as before; and so is the related Rule 305, with some amendment of wording—including "curtilage," a noble word, but rather suggestive of the legal scribe.

The Flex Evil

Rule 307, dealing—now somewhat more definitely—with flex, is, rightly considered, one of the most important in the book. Flex—bruised, frayed, kinking and perishing flex—is the weakest link in the electrical chain. If by some miracle of invention it could be totally abolished, it is a fair guess that the annual electrical mortality would be cut down by a half. Considering its everyday abuse and misuse, it is a marvel it doesn't double it, a marvel only to be explained by supposing E.D.A. to have a secret pull with Atropos. The trouble is that anyone who thinks himself a handyman—as we all do—considers himself competent to replace a faulty flex—if he does think of replacing it. He goes out to the nearest ironmonger or cheap store and, blissfully unconscious or contemptuous of Rule 307B, buys whatever is offered him—usually rubbish. The only thing he—or his wife—is definite about is its colour. The whole question of the shoddy foreign electrical supplies available to the householder calls for investigation. I.E.E. rules, however stringent, cannot touch it. Popular education might help, but only legislation can solve the problem—and its solution daily becomes more urgent.

(At this point I invite the reader to do as I have just done: put down his paper and look about him. I can see a heater, a radio set, a floor- and a table-standard—and none of them is wired with circular flex. The best I can say for it is that it's C.M.A.—and that's more than some will be able to say!)

In Rule 308 an alteration to be noted is the increase to 0.2 sq. in. in the size of one of the cables whose use it limits. Rule 309 is considerably altered. The new note to clause A is that formerly attached to 311F. The old note is now amplified to a separate clause B. It is practically the old Rule 1301L (switchboard connections), except that the B.S.S. scheme of colouring is now an optional alternative.

Rules 310 and 311 are those specifying the distinctive colours for cables. In their old form they have been criticised for their needless length. They are now rather longer. They are evidently framed with the idea that a repetitive dissection is freer from possible misunderstanding than any summary, however carefully worded. It is an erroneous idea. A summary, which in this case need not have occupied more than a third of a page, would obviously be more easily grasped than nine separate, slightly differing statements. For instance, 310A,B and 311A could have been covered without any loss of definition by the words "Any two-conductor circuit—Red for 'outer,' positive, or switch wire. Black for 'middle,' negative, or 'neutral' wire."

Better still, the whole of the space occupied by these two rules could be saved by adding to Rule 309 a reference to Table 2. In this every possible system of wiring is already tabulated, and another column added to it would give, in the most convenient form, the appropriate cable colours.

In Rule 312, clause A is tightened up, in that soldering sockets (or clamps) must now be fitted to all cable ends larger than 7/.044—formerly 19/.052. Clause G is new, and has a useful note. Clause I deals with m.-i. c.-s. cables. The rest of the rule, with some alteration in the order of the clauses and in their wording, is as in the 10th edition. Rule 313, too, is little changed, except its clause D, which is worded in greater detail, avoiding the former reference to Rule 1322.

Ambient Temperatures

There is an extra rule in this section, but it is not actually new. It is mainly the old Rule 401, transferred from the beginning of the next section, the better to conform with the revised titles of the two sections. Clause A is as before, but the note is shortened by the reference to hot water ducts, etc. To replace this, we have a new and valuable clause B, limiting ambient temperatures for various types of cables. The remaining clauses are practically identical with those of the old rule.

Coming now to Section 4 (with all its numbering unfortunately out of gear) we find that Rule 401 (formerly 402), dealing with bare conductors, is practically the same as before. Clause A is part of the old preamble. What was clause A is now B; and in this should be noted the words "or with the wires or cables of any other wiring system in the same building," an addition which will be found in 402 and following rules. Clause H has also an amendment, covering trolley wires.

Writing in these pages, in 1935, I said it was a pity the Wiring Regulations (10th edition) should give countenance, as they did, to the use of flex for permanent work, in any circumstances. It is good, therefore, to see that the old Rule 404 (now 413) has been reworded to ban entirely the use of flex for fixed wiring. The old 405, modified accordingly, is relegated to Section 6. But why not to Section 5, since it is now limited to temporary work?

Rule 403 (formerly 406) has several amendments. There are now a number of exemptions to clause A. The note on corrosion attached to C is usefully expanded. To G is added an unnecessary proviso that cables under floors should be protected from damage by the boards. Unarmoured metal-sheathed cables, carelessly installed, might be nipped or flattened by the floorboards, but that possibility is clearly covered by Clause B. Clause J is new, and good. A similar new clause (J) has been added to Rule 404, which otherwise follows closely the corresponding rule in the 10th edition. The new notes to clauses A and D are interesting.

Conduits

In Rule 405 (conduits) the former reference to rules in Section 13 is omitted, the preamble to the new Rule 1301 sufficiently replacing it. Clause B has the same exemptions as 403A, with which, in fact, it is otherwise identical. This, with C, is an expansion of clause C of the old rule. The clause dealing with condensation, with its amendment of 1935, has now been dropped. This is curious, for condensation trouble is one of the weaknesses of the conduit system. Per-

(Continued at foot of next page.)

CORRESPONDENCE

Every letter must be accompanied by the writer's name and address preferably, but not necessarily, for publication. The Editors cannot accept responsibility for correspondents' opinions

Conditions in China

PREVIOUS to the Sino-Japanese hostilities considerable electricity supply developments were taking place in all the larger Chinese towns, often in combination with the water supply. In these developments British plant figured very largely. Many of the stations have been seriously damaged, those at Nanking, Hangchow and Canton having suffered considerably and the present position of electricity supply in these towns is obscure. In Shanghai, the Power Co. was extremely fortunate, as fighting took place up to the boundary walls of the power station, which stands intact in a devastated area. The bridges over Soochow Creek carrying the cables from the power station into Shanghai were undamaged and the residents received a supply throughout all hostilities.

In Chungking, the present capital of China, a new power station with British plant has just been completed and it is believed that up to the present time in spite of the repeated bombing of the area this station is still intact.

In Hankow there are two undertakings, one British and one Chinese, both of which are somewhat out of date. Previous to hostilities plans were well advanced for the erection of a new power station to meet the growing needs of this rapidly developing industrial centre. Just before the arrival of the Japanese, the Chinese company removed and shipped up river the largest and most modern set together with some of the boilers, so that at the present time there is a considerable shortage of power in Hankow.

Hankow was one of the most fortunate cities over which the wave of hostilities passed, in that the power supply was kept going continuously, no damage having occurred during the many bombing raids. The British company in Hankow which supplies the old concessional areas has kept running, except for a few hours due to coal shortage, and it was a surprise to the Japanese to march into a town where the streets were all lighted. The fact that power supply was available through all the difficult periods greatly mitigated the inconvenience which otherwise might have been suffered by the population.

At the present time many laid-up ships on the river and the British and French gunboats take their electricity supply requirements from the shore supply in order to make them habitable for the crews and to conserve their oil fuel, supplies of which are difficult to obtain as the river is closed, except to Japanese military traffic.

The development of the industrial centres in China will require a great deal of electrical plant when the fighting is over and a stabilised currency is available. British manufacturers of generating and steam raising plant should be ready to assist in this development, the extent of which may be very large indeed. Taking Hankow, for instance, the existing stations will be unable to supply the manufacturing needs, which will rapidly develop when hostilities cease and the river and usual communications reopen.

Hankow, the major inland city of China, is laid out on modern lines, excellently situated, having rail communications to Peiping in the north, and Canton in the south with the Yangtse River running east and west. The latter is capable during many months of the year of navigation by ocean-going steamers. Roads, at present poor, will develop and air services will no doubt be soon in operation in many directions, but at the moment this town is practically isolated from a commercial point of view.

The standards of electric supply voltage and frequency laid down by the Chinese Government are similar to those in England, so that standard types of British plant and apparatus will be suitable. Transmission voltages will probably be limited to 33 kV as a maximum, since there is no prospect whatever of any interlinking between towns, the industrial centres being far apart and the loads comparatively small. Street distribution in China is almost entirely by overhead cables of the bare or braided type and very little low-voltage underground cable is used. Climatic conditions rarely interfere with overhead distribution and floods, to which many towns are subject, encourage its use.

As regards small motors, lighting fittings, lamps, neon signs, radiators, refrigerators and cookers, the price of imported foreign makes is generally prohibitive. The consumers' needs in this respect will have to be met by apparatus of local or Asiatic manufacture. Possibly enterprising British manufacturers will consider setting up works to manufacture these articles in China, as there will soon be no hope at all of imported goods being in a competitive position.

It is difficult to foresee what the financial position will be in China in the future, but in a country that is over 90 per cent. agricultural it is claimed that two good harvests will put China on her feet again. Excellent coal supplies are available throughout the country and labour is cheap. There is no question that China will need the assistance of British finance and manufacturers when conditions are stabilised and the situation is one that should be watched carefully so that no opportunities shall be lost.

A BRITISH ENGINEER.

Hankow, *August 9th.*

Two-part Tariff Fixed Charges

Mr. J. Ratcliffe seems to have missed the whole point of Mr. H. C. Busbridge's letter which, it was abundantly clear (to me at any rate), concerned only domestic two-part tariffs with a plea for standardisation of the basis upon which the fixed charge is computed, and not for standardisation of yield.

As far back as 1930 the Electricity Commissioners appointed a committee to inquire into this question, and the conclusion reached was that the best method of determining fixed charges was on the basis of floor area. Upon what grounds this method can be considered as superior to the rateable value method it is difficult to understand, since the latter bears close relation to the size of the premises and is far more readily ascertainable.

Why, however, should it be necessary to employ extraneous media to compute fixed charges? Why not use the consumer's demand as the basis of reckoning, notwithstanding that this would necessitate installing m.d. indicators? Whilst such kW demands would not be accurately related to the undertaking's maximum demand, owing to the time element, the basic method would prove more equitable to all concerned.

I.E.E. Regulations (*Concluded from preceding page*)

haps it is considered that the point is covered by clause M.

Clause D is new and important. It defines the capacity of conduits by reference to Table 18 (formerly 22), compliance with which is no longer left to option. In the new table the number of wires allowed per conduit has been generally increased, and alternative figures are given, *e.g.*, seven 3/.029's can be drawn into a run of ¾ in. conduit with boxes not more than 14 ft. apart and not deflecting from the straight by more than 15 deg. Otherwise, the number must not be more than five. This compares with four, for either case, recommended in the 10th edition.

Clause F is also new. Its effect is to ban the poor practice of butting—or merely ending—conduit in wood blocks; see also Rule 610B. It is rather contradicted, however, by clause G, which still allows factory-made open sockets to be used as wiring outlets. The rule could be made clearer; and it ought to cover "socket-outlets"—a term, by the way, confusing in this context—whether switch-combined or not.

The note on corrosion attached to Clause J has been amplified. Clause L, reworded, with a new note, is clearer than the corresponding clause in the last edition. P is a new clause. Rule 407 is merely repetitive. All it says has already been said in 315A (note) and 401H. So, for the matter of that is the next rule, 408, a new one dealing with m.-i. c.-s. cables.

No one reading this section can fail to be struck by the similarity between this rule, 408, Rules 403 and 404, and, in a lesser degree, Rule 402. Between them they occupy a little over 6½ pages, or practically half the section. Rule 408, except for three lines at the end, is almost word for word a repetition of certain clauses of 403. Its clause C is a slightly varied repetition of 404H, 403G, and 402F. These four rules could easily be redrafted to occupy no more than three pages between them, with a gain in clarity. It is only a question of covering the much which is common to them by a suitable omnibus clause—as was pointed out in a recent editorial (ELECTRICAL REVIEW, July 7th.)

The remaining rules of this section do not call for comment as, except for slight verbal alterations, they tally with those in the 10th edition. Nor need the next section, concerned with temporary lighting, detain us. The first rule (501) of the 10th edition has been rearranged and split into four, with advantage. That accounts for the increase from seven to ten rules, as there is nothing else new in it, except a good note to Rule 506.

Predetermination of fixed charges is too inflexible to relate them properly to the actual standing charges, which after all depend to a great extent upon the greatest simultaneous load.

Consider a consumer occupying an all-electric house with 30 kW installed, rated at £20 per year. At 15 per cent. of the rateable value his fixed charge is 15s. per quarter, irrespective of whether he has in use the whole 30 kW for a short period corresponding with the time of the undertaking's peak or not. Although the time element precludes the accurate relating of individual demands to the undertaking's peak, a charge of a few shillings per kW of registered maximum demand would yield an amount which would vary proportionally with the variation of the undertaking's maximum demand.

In view of the fact that seven-eighths of the total expenditure is in respect of standing charges, the question of recouping an amount sufficient to cover such charges cannot be treated lightly.

BERNARD POINTON.

Salford, *August 26th*.

A.R.P. Lighting

New British Standard Specifications

FOUR new specifications have been issued by the British Standards Institution at the request of the Home Office A.R.P. Department. The first of these is B.S./A.R.P.6, which deals with the electric lighting of public shelters for 50 persons (210 sq. ft.) or multiples up to 200 persons. A separate specification for shelters for 250 persons will shortly be published.

Where no mains supply is available electricity will be provided by 12-V lead-acid or alkaline batteries with capacities of not less than 55 Ah at 120-hr. discharge rate. Four lighting points are required for fixed bus type 10-W 12-V b.c. lamps, and a fifth for a similar portable lamp; there should be two circuits, each protected by a s.p. fuse, and a s.p. switch normally at the main entrance.

All circuits are to be wired with 3/.036 t.r.s. twin cable run on cleats fastened to walls and ceilings. The hand lamp must have a wire guard and reflector, and also 4 yd. of 40/.0076 t.r.s. flexible wire. Spare equipment will comprise nine lamps, six cartridge fuses or equivalent fuse wire, two large spring clips for connecting up a car battery in emergency and a primary-cell or unspillable accumulator hand lamp. It is laid down that the last must be in accordance with the new B.S./A.R.P.3.

Where a mains supply is available a similar battery is called for as stand-by. Ten lighting points are required. One of these will be near the switchboard and connected to the battery through an independent s.p. fuse and switch, the other nine being wired in two circuits. The circuit with five points (including one for a portable lamp) will be divided into two sub-circuits each with its own s.p. fuse and switch, all connected to a change-over switch, so that if the mains supply fails the five lamps can be supplied from the battery. The four-light circuit has also to be controlled by a s.p. fuse and switch.

The transformer must be double-wound with an output of 250 VA at 12-V and have a tapping for battery charging equipment, when required. Wiring, lamps, hand lamps and spare equipment will be as for the first case. The installation must comply with the I.E.E. Regulations and with the appropriate British Standard Specifications.

A third standard, B.S./A.R.P.16, which has been prepared by the Illuminating Engineering Society, covers methods of providing even illumination of low intensity which may be left in operation during an air raid. The fittings must not emit any measurable light above 5 deg. below the horizontal and must maintain a uniform horizontal illumination of about 0.002 ft. candle at ground level.

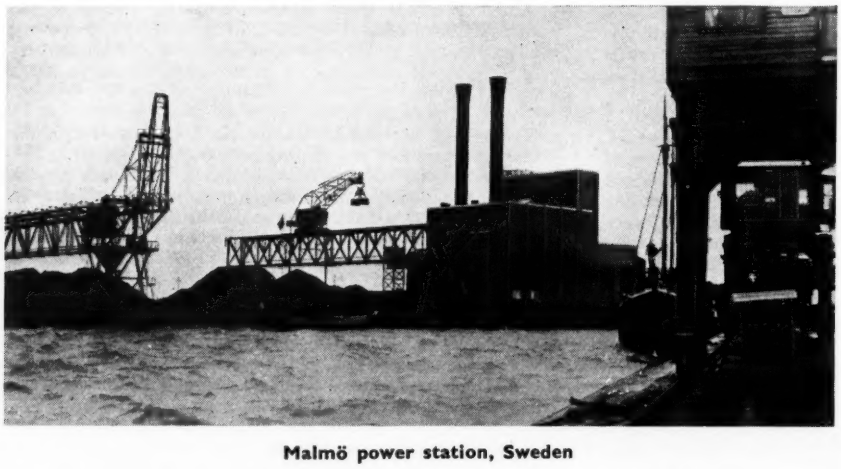
The fitting consists of an iron or aluminium cup and shade (of specified detailed dimensions), the whole measuring 3⅞ in. vertically and 5⅛ in. horizontally, treated with a double coat of dead matt black for a mounting height of 10 ft. with a reflecting power not above 5 per cent. or of battleship grey for heights of 15 to 20 ft. with reflecting powers of from 10 to 30 per cent. A 15-W pearl tungsten-filament lamp is used.

The last specification relates to light locks for shop entrances, B.S./A.R.P.15. The light-lock consists of a passage having dull-black walls and ceiling with two right-angle turns, one opening on to the street and the other on to the shop interior. The minimum length of its outer wall is three times and of the other walls twice the width of the passage (which must not be less than 2 ft. 3 in.), thus giving a central overlap equal to the width. Generally a 15-W lamp in an appropriate shield should be mounted on the ceiling to give 0.02 ft.-candle. Sources of light in the immediate vicinity of the entrance to the shop interior should be shielded.

Copies of these specifications (3d. post free) can be obtained from the British Standards Institution, 28, Victoria Street, London, S.W.1.

Swedish Stand-by Steam Station

THERMAL plants are being provided in the larger centres in Sweden as stand-by to the hydro-electric stations which provide most of the electricity used. That recently completed in Malmö has a triple purpose, to operate economically over long periods (should the rivers supplying the hydro plants freeze), to have a considerable overload capacity and to start up rapidly with cold boilers. The plant is situated near the quay to enable coal supplies to be brought by water and transferred to a belt conveyor feeding the bunkers.



Malmö power station, Sweden

The main floors of the boiler house, pump house and engine room are on the same level and as a glass partition separates the boiler house and pump house which is separated from the engine room only by columns, there is an unobstructed view from one part to another.

A 30,000-kW, 3,000-RPM three-phase, 50-cycle alternator (by A.S.E.A.) generating at 5,000 V is direct coupled to a turbine designed for steam conditions of 440 lb. per sq. in. and 750 deg. F., but with the possibility of working at 840 deg. Steam is provided by two Jönköpings Mekaniska Verkstad tri-drum boilers with vertical tubes and water cooled combustion chambers.

The auxiliaries are driven by squirrel-cage motors which, when the station is not in operation, are connected to the network, being automatically transferred to the alternator supply when the station is started up. The auxiliaries include one 400-HP and one 270-HP 3,000-RPM fuel-pump motors, as well as the motors driving the conveyor, stokers, draught fans and pumps for heavy fuel oil which can be used instead of coal or during starting up. Tests showed than one man was able to run up the boilers from cold to full steam pressure in thirteen minutes, and the turbo-alternator from cold to full load in six minutes.

NEW ELECTRICAL PRODUCTS

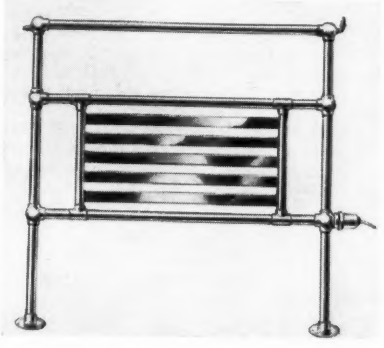
A Review of Equipment Recently Marketed

Electric Towel Rail

THE latest bathroom towel rail of BENHAM & SONS, LTD., 66, Wigmore Street, London, W.1, employs flat bar heaters to provide the warmth.

The general construction is tubular and of usual design, with the flat bar heater in the centre of the frame. The whole unit is normally chromium plated, although a cadmium plated cast-iron radiator can also be obtained.

Two models 2 ft. 6 in. and 3 ft. long are available with loadings of 200 and 225 W, respectively.



Benham towel rail

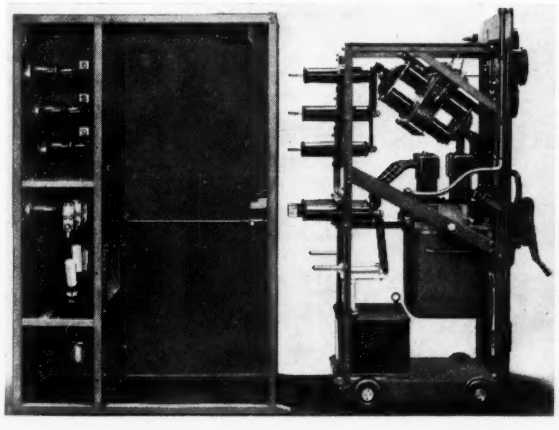
Truck-Cubicle Switchgear

The latest TCA-class truck-cubicle gear offered by SWITCHGEAR & COWANS, LTD., Elsinore Road, Old Trafford, Manchester, 16, for installation in sub-stations is constructed in the conventional two portions of angle members and sheet-steel welded and bolted together; cast-iron is not used. The rear section of the fixed housing is screened off from the rest, but is accessible for authorised inspection from the front when the truck portion is withdrawn.

Removable plates provide for bus-bar extension sideways for composite switchboard formation. The truck portion moves on double-flanged roller wheels and dowels ensure register of the main and auxiliary contacts. Mechanical interlocks are fitted and the orifice shutters can be made to lock in position if desired. The bus-bars are rectangular and arranged in the vertical plane.

There are no double joints; split spring-loaded tongues mounted on braced insulators, with cork packing for flexibility and a rear spigot to retain alignment, engage with jaw-type contacts formed by the bus-bars and their supports, while the isolators on the cable side engage with receptacles forming part of the contact to which the cable thimbles are secured. Secondary wiring is enclosed in a trough at the top and access to the secondary plugs is obtained through an inspection plate in the " roof " of the cubicle without disturbing the main equipment.

A choice of current transformers is offered, either porcelain insulated, wound, or composite insulated. Potential transformers are oil immersed, with secondary circuits protected



S. and C. type TCA truck-cubicle switchgear

by cartridge type instrument fuses. The cable box at the base is accessible from the front.

Type " A " circuit-breakers fitted in these trucks are described as fully pre-tested in accordance with B.S.S. 116, Part 1 (1937), performance data being available on request. They are technically of the plain break class, made in five capacities of 75/100/150 MVA at 11 kV and 100/150 MVA at 6.6 kV. The three-phase type contains only 8.5 gallons of oil in a semi-rectangular tank (large radius corners) for wide phase separation.

The heavier duty tanks have an external reinforcing rib; all are lined with treated " Elephantide " and phase barriers of similar material are made flexible for smoothing out impulse pressures associated with any one phase.

Ribbing on the under side of the top plate is intended to control oil flow and increase turbulence around the arcing area. The terminal insulators cemented into the top plate are porcelain for 11 kV, while bakelite bushings reinforced with brass inserts throughout their length are used for 6.6 kV. Each pair of finger-type contracts is separately sprung and divided from its adjacent pair by a bakelite fillet, and side plates act as dividing stops to limit electro-mechanical movement; the 6.6 kV contacts are fitted with renewable auxiliary arcing contacts.

The usual automatic tripping devices are provided, the closing mechanism being totally enclosed and of the free trip type, there being a trigger for hand releasing and a mechanical on-off indicator. Spring-loaded or DC solenoid closing mechanism can be provided if desired.

Safety Kettle and Travellers' Iron

Heavy gauge polished aluminium is used in the construction of the new automatic kettle of L. G. HAWKINS & CO., LTD., 30-35, Drury Lane, London, W.C.2. The lid is large—4¾ in. in diameter—and the handle is of bakelite. Three heat-insulating feet enable the kettle to be used on a table. A 1-kW immersion element is used to heat the three pints of

Hawkins kettle and iron

water. The solid circular type bakelite connector is equipped with an earthing terminal and 2½ in. of black rubber sleeving. Should the kettle boil dry the connector is forcibly ejected, but can be replaced as soon as the temperature has fallen to a safe level.

Another new product is a 2-lb. iron for travellers. The handle is removable and folds flat in a suède leather case, and the iron has a large-area, quick-heating flat surface.

A Novel Telephone

An unusual type of telephone, which is very suitable for emergency or stand-by uses because it is entirely independent of external sources of electricity, is made by ALFRED GRAHAM & CO., LTD., Caxton House, Tothill Street, London, S.W.1.

The instrument is voice-energised electro-magnetically without the aid of a battery, accumulator, or generator of any sort. The hand set is of conventional shape and size, constructed of non-corrosive aluminium alloy, and has a pleasant weight balance.

The receiver is made with extra care for sensitivity, though not otherwise special, but the transmitter is novel. It is, in effect, a miniature balanced armature loud speaker utilised in the reverse direction, the employment of special magnet steels enabling the apparatus to be made small enough to fit inside an ordinary hand set. A very thin alloy cone-shaped diaphragm has attached to its apex a short reed, the opposite end of which is fixed to a light metal vane pivoted in a particular manner (which constitutes the essence of the refinement) in a narrow gap between the poles of a strong magnet.

Graham voice-energised telephone

Speaking close into the mouthpiece causes this articulated

system to vibrate, so varying the magnetic field and thereby modulating the current induced in coils wound on the magnet limbs. In this way an output of between 3 and 4 W is obtainable, which is more than double that achieved previously with any similar arrangement. Two wires only are required between instruments, and high line resistance has very little effect on speech volume.

This type of telephone is particularly suitable for use in very noisy situations; with an extra receiver (one for each ear) two-way communication can be carried on in noise levels exceeding 100 phons. For power stations, engineering works and marine uses these instruments are made up in aluminium alloy cases, which are weatherproof and non-corrosive.

The bell calling device may if desired be fitted separately and is quite independently energised by a magneto-type generator, with a high gear ratio, actuated by a ratchet lever.

A.R.P. Equipment

Among the electric lighting equipment coming under the heading of "A.R.P." is the "999" lantern of L. G. HAWKINS & Co., LTD., 30-35, Drury Lane, London, W.C.2. Three models of this self-contained battery-operated lantern enable it to be pivoted only, pivoted and focused or pivoted and focused with twin bulbs according to model. The lantern is cylindrical in shape, and is mounted on a small standard. The 6-V battery gives 100 hours of lighting. The company also supplies screens for bollards, luminous direction indicators and hurricane lamps, while a special bedlamp spotlight screen is also available.

OLDHAM & SON, LTD., Denton, Manchester, have devised the "Toucan" lamp which has a miner's lamp accumulator in a tough rubber casing, the lamp being situated at the top of the accumulator and shielded by a rubber hood. The lamp has two filaments each with a life of about 500 hours, and a three-way switch gives a choice of filaments. There is virtually no acid to spill as it is almost all absorbed by the "Sponac" separators. The weight is 5½ lb.

A moulded shade which blacks out all light except that directly under it is a recent introduction of Ward & Goldstone, Ltd., Frederick Road, Manchester, 6. It will take lamps up to 100 W. This company is also producing the "Arplyte" portable emergency lamp. It comprises two large capacity 3-V dry batteries in a carrying case, and the "Goldtone" inspection lamp fitted with 9 ft. of flex and a 6-V lamp. Alternatively a lamp can be fixed directly to the battery. The weight is 4 lb. 11 oz.

The latest portable handlamp of EASCO ELECTRICAL SERVICE, 1, 3 and 18, Brixton Road, London, S.W.9, is fitted with an unspillable 6-V "Dagenite" accumulator, and will keep a 12-W lamp running for 9 hours, or a 3-W lamp for 20 hours continuously. With intermittent use 250 hr. per charge is claimed. The light fixed on top of the lid is of frosted glass 3 in. in diameter and 4 in. high, the lamp itself being a dual-filament 6-V bulb.

Indian Electrical Imports

Good U.K. Share in Face of Competition

THE following statement, based upon the recently issued annual foreign trade returns of the Government of India, gives the values of imports of electrical goods by countries in 1937-38. Notes of increases or decreases compared with 1936-37 have been added for comparison. Imports in both the electrical machinery and the electrical instruments and apparatus groups have continued to advance steadily during the past few years.

While the United Kingdom has remained predominant generally, certain competition is worthy of note. For example, between 1936-37 and 1937-38 Germany increased her trade as a whole by over 30 per cent. and showed special strength in the switchgear, motor and transformers sections. Switzerland also did about 25 per cent. more trade, while Japan's share, at about one-seventh of the total, has not greatly varied for some years. Imports of Canadian electrical apparatus into India showed a tenfold increase on 1936-37. In the radio group the United Kingdom makes a poor showing.

The future looks promising in view of the hydro-electric schemes and extensions which are planned or under consideration in the Punjab, Hyderabad and Madras. As these come into operation there will be an increased demand for small motors for well pumps, operations on the farm or plantation and cottage industries, together with the necessary installation material. With regard to local manufacture, there is a movement to develop this in the centres where engineering workshops are extending, but so far it has not advanced much beyond the production or assembly of the simpler kinds of electrical equipment, including lamps. There is little doubt, however, that the range will be added to, as it has been in other countries where iron and steel production and engineering have developed.

	1937-38 Rs. (000)	Inc. or dec. on 1936-37 Rs. (000)
Fans and parts—		
Total	3,107	− 409
From United Kingdom	1,551	− 853
,, Germany	386	− 72
,, Italy	639	+ 339
,, Japan	261	+ 91
,, United States	256	+ 103
Wires and cables, rubber insulated—		
Total	4,238	+ 1,040
From United Kingdom	2,854	+ 546
,, Germany	529	+ 49
,, Belgium	504	+ 271
,, Japan	226	+ 130
Wires and cables, insulation other than rubber—		
Total	6,479	+ 2,122
From United Kingdom	5,255	+ 1,782
,, Germany	592	+ 175
,, Belgium	296	+ 144
Telegraph and telephone wires and cables—		
Total	433	+ 75
From United Kingdom	388	+ 221
Telegraph and telephone instruments and apparatus—		
Total	2,239	+ 319
From United Kingdom	1,547	− 134
,, Germany	630	+ 450
Gas-filled electric lamps—		
Total	1,994	+ 356
From United Kingdom	1,149	+ 19
,, Germany	125	+ 59
,, Holland	344	+ 154
,, Hungary	141	+ 23
Vacuum electric lamps—		
Total	1,577	+ 327
From United Kingdom	483	− 66
,, Holland	303	+ 109
,, Japan	428	+ 168
Electric bulbs for vehicles—		
Total	117	+ 26
From United Kingdom	17	+ 1
,, Holland	34	+ 10
,, Japan	18	− 2
,, United States	42	+ 13
Electric bulbs for torches—		
Total	268	− 49
From United Kingdom	12	+ 9
,, Japan	72	− 5
,, United States	187	− 39
Other electric lamps—		
Total	971	+ 272
From United Kingdom	109	− 5
,, Germany	254	+ 109
,, China	242	+ 10
,, United States	143	− 42
Parts and accessories of electric lamps—		
Total	430	− 972
From United Kingdom	78	+ 43
,, Hongkong	92	− 241
,, Germany	89	− 362
Radio receivers, complete—		
Total	2,811	+ 294
From United Kingdom	699	+ 122
,, Holland	626	+ 245
,, United States	1,225	− 146
Radio valves—		
Total	212	+ 40
From United Kingdom	86	− 8
,, Holland	60	+ 45
,, United States	60	− 1
Component part of radio receivers other than valves—		
Total	595	+ 77
From United Kingdom	191	− 104
,, Holland	174	+ 152
,, United States	182	+ 19
Other radio apparatus—		
Total	1,152	+ 839
From United Kingdom	579	+ 282
,, Holland	400	+ 399
Batteries for flash-lamps—		
Total	2,212	*
From United Kingdom	13	
,, Hongkong	95	
,, Germany	420	
,, Japan	71	
,, United States	1,540	
Other batteries—		
Total	309	*
From United Kingdom	114	
,, United States	153	
Electric carbons—		
Total	271	+ 78
From United Kingdom	58	− 11
,, Germany	98	+ 46
,, United States	91	+ 32
Accumulators—		
Total	706	− 232
From United Kingdom	636	+ 120
Electric condensers—		
Total	48	− 1
From United Kingdom	23	− 8
,, United States	13	+ 8
Electric bell apparatus—		
Total	92	+ 32
From United Kingdom	29	+ 9
,, Germany	56	+ 21
Electric lighting accessories and fittings—		
Total	768	+ 123
From United Kingdom	355	− 8
,, Germany	254	+ 100
Meters—		
Total	1,193	+ 54
From United Kingdom	527	− 106
,, Germany	401	+ 60
,, Switzerland	108	+ 18
Other electrical instruments (not telegraph or telephone)—		
Total	620	− 157
From United Kingdom	321	− 58
,, Germany	162	− 97
,, United States	102	+ 29
Electro-medical apparatus—		
Total	653	+ 289
From United Kingdom	123	+ 32
,, Germany	255	+ 95
,, United States	247	+ 148
Switchboards, other than telegraph or telephone—		
Total	473	+ 163
From United Kingdom	418	+ 129
Other electrical goods and apparatus—		
Total	3,909	+ 923
From United Kingdom	2,199	+ 255
,, Germany	811	+ 273
,, Holland	102	+ 25
,, Japan	240	+ 130
,, United States	412	+ 177
Control and switchgear—		
Total	5,482	+ 600
From United Kingdom	3,802	+ 178
,, Germany	1,068	+ 500
,, United States	342	− 218
Generators, alternators and dynamos—		
Total	2,590	− 1,388
From United Kingdom	1,450	− 1,858
,, Sweden	273	+ 80
,, Germany	229	− 161
,, Switzerland	384	+ 373
,, United States	160	+ 123
Motors—		
Total	4,692	+ 1,167
From United Kingdom	2,548	+ 398
,, Germany	1,084	+ 317
,, Switzerland	361	+ 292
,, United States	260	− 56
Transformers—		
Total	2,623	+ 657
From United Kingdom	1,647	+ 373
,, Sweden	128	− 27
,, Germany	503	+ 265
,, Belgium	174	+ 149
Turbo-generating sets—		
Total	884	− 646
From United Kingdom	497	− 663
,, Sweden	232	+ 57
,, Switzerland	118	+ 16
Other electrical machinery—		
Total	10,636	+ 999
From United Kingdom	6,474	+ 74
,, Germany	1,901	+ 225
,, United States	827	+ 197

* Comparative figures not available.

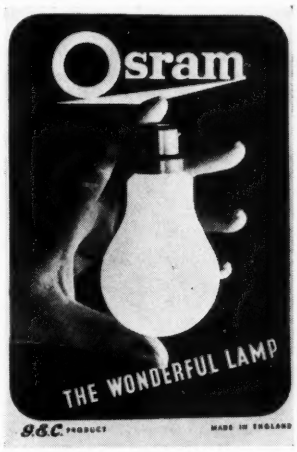
LAMP PUBLICITY

Manufacturers' Plans for the Coming Lighting Season

DEALERS in electric lamps can never complain that they do not receive adequate support from the manufacturers. The particulars so far received of advertising schemes and publicity material for the coming lighting season appear, if possible, to be even more enterprising and elaborate than in previous years, and should help considerably to make the public "light conscious." The plans of manufacturers other than those detailed below will be published when they are announced.

General Electric Co., Ltd.

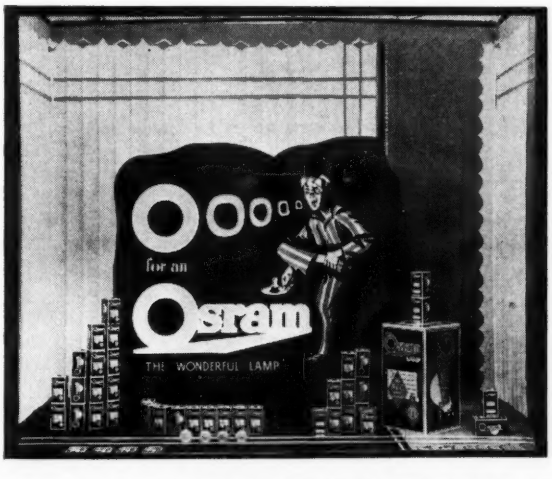
THE "Osram" lamp poster campaign for the new season will, it is claimed, be the largest in the history of electric lamps. Most of the hoarding displays will be 16-sheet positions, but these will be supplemented by 8-sheets where the larger sites are not available. London will see displays on escalators throughout the Underground Railway system. The design of the poster is bold and simple—a hand holding a lighted lamp supported by the "Osram" trademark and the well-known slogan "The Wonderful Lamp."



"Osram" poster

For the dealer there is again an abundance of sales-aids, showcards and cut-outs for window and counter displays tying up with the poster campaign, and ample supplementary literature. An entirely new catalogue contains a coloured supplement of "Osram" lamps used for decorative lighting.

A new window display has again been built up around the "O for an Osram" slogan. The design of a boy, who has knocked his foot against a stool through the lamp having failed and who has consequently had to use a candle, introduces a human touch. The display is in two sizes which can be accommodated in all normal sized windows. They will be installed for a run of a fortnight by the Dealer Service Department, the installations commencing on September 4th. An illuminated cut-out, a reproduction of the poster, will be obtainable in three sizes. The hand holding the lamp stands out from the background, and the lamp is illuminated from behind. The background is printed on linen and the lettering is lighted from the back. The successful campaign for printing the slogan "O for an Osram" on shop windows adopted last year will be continued.



"O for an Osram" is again the slogan used in the "Osram" window display

Metropolitan-Vickers Electrical Co., Ltd.

THE "Cosmos" lamp publicity embraces everything the retailer needs for a campaign to remind potential customers that "Better Light Means Better Sight." In a new window display, mounted in the top of an attractive cabinet, is a mystifying sign in which a lamp carton and an actual lamp are apparently "dissolved" into one another. This display piece is flanked by wings which are separately mounted to permit spacing out the display in a large window.

New "Cosmos" window display

For small windows or as a showroom reminder display an entirely new folding unit has been provided, finished in chromium foil with red facings. A limited number of 36 in. by 20 in. rubber mats is available finished in blue rubber with white shadow lettering. A new edition of envelope enclosures draws attention to the value which industry places upon good lighting and by comparison helps to create a desire for better lighting in the home. It is attractively finished in two colours and the retailer's name and address are printed free of charge on the cover for any reasonable quantity.

The "Cosmos" envelope enclosure

In addition to these special sales aids the "Cosmos" lamp catalogue and the pocket price list offer concise details of the full range of "Cosmos" gasfilled lamps and "Metrovick" discharge lamps, together with useful information on lighting matters generally. Special publications entitled "Decorative Lighting" and "Calculated Control" deal with all varieties of decorative, industrial and street lighting.

For the display of "Metrovick" type "B" lamps an attractive folding unit is available finished in gold foil with red and black facings. A neat mirror glass showcard measuring 6 in. by 4 in. and finished in three bright colours is useful as a reminder advertisement on the retailer's counter or for adding the finishing touch to a window display.

Siemens Electric Lamps & Supplies, Ltd.

PUBLIC attention will again be directed to the quality of Siemens lamps. Advertising in the National and Provincial Press will be employed for the main appeal, fifty trade journals being used to reach the many large shop, factory, office and public institution buyers.

A striking window display has been prepared in clear, well-balanced colours. It is packed folded flat and opens out in two planes, wiring being provided for the lighting. The central feature is an array of flowers set in a Wedgwood blue vase, at the base of which are two pearl lamps. The flowers

are ingeniously arranged in an intricate cut-out, and when illuminated are shown in their natural tints. The vase and flowers are set in a large circular bronze blue background, while at the bottom is a sloping platform of embossed silver,

Siemens' "Judge" showcard and "Vase" window display piece

which again reflects light and colour. The theme of the display is "Siemens lamps brighten the home."

The new season's showcard design in nine colours incorporates a large lamp surmounted by the head of a judge, and a slogan, "The Verdict of all Good Judges" appears on a blue scroll encircling the lamp. Beneath the lamp is the wording "Siemens for Reliability." A lamp counter showcard is also available incorporating a device for holding price lists. Attractive leaflets of pearl, opal and clear lamps, and also automobile lamps will be available overprinted with dealers' names and addresses.

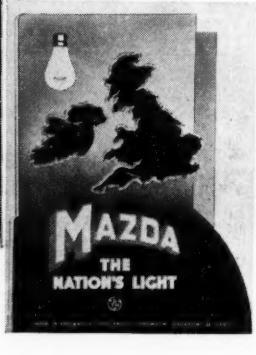
British Thomson-Houston Co., Ltd.

THE "Mazda" publicity maintains the high standard set in previous years, the material available including striking and carefully thought-out window displays, a series of attractive showcards, and folders full of well-arranged information. "The Nation's Light" is still the company's motto, and the nation-wide aspect is ingeniously emphasised in the main display piece by a map of the British Isles. An opening, shaped to the map, is cut in the front portion, and behind this is a representation of a night landscape pierced with many small apertures, a concealed 60-W lamp producing a remarkable effect. The cut-out measures 36 in. by 22 in. by 6 in. and is supplied complete with flex, adaptor and lampholder.

A novel window-piece for the B.T.H. pearl lamps (type "B") brings in the price, 1s., as its principal *motif* in a large silver-tinted coin. In blue lettering appears on the coin the legend "The Shilling Lamp of Sterling Worth"; and immediately beneath are three cartons surmounted by three lamps of 25, 40 and 60 W, standing on a blue, shaped base incorporating a portrait of the 100-W size with its price 1s. 6d. Another effective display, 30 in. high by 30 in. wide, specialises on the "Mazda Newelite" lighting unit for staircase or ceiling and shows the lamp with its fitting in use.

The "Mazda Multi-lamp" window set tells the story of all kinds of "Mazda" lamps in a way that the passer-by can comprehend at a glance—the general service types, tubular, motor-car, "Newelite," decorative, &c. In the central panel actual lamps are cemented into shaped apertures and the whole is solidly built of wood. A neat addition to the displays available is a pyramid cut-out, taking up little space, and suitable for counters and windows. On a small well-modelled pyramid with the map design on one of its triangular faces is mounted, apparently precariously, a "Mazda" carton with its lamp half visible.

In the new black and gold showcards for the ordinary household and general service lamps, the map of the British Isles is shown foreshortened in a circle, upon which a lamp is posed, with "Nation's Light" as the wording. For the motor car lamps the map (this time, having the appearance of a motorist's map) provides a striking background for a card showing prices and types: on the back are particulars of the lamps needed for practically all makes of cars and commercial vehicles.



B.T.H. Type B lamp display, the "Mazda" automobile showcard and an illuminated "Mazda" display

A revised edition of the "Mazda" catalogue has 56 pages. The "Alphabet" series of light tubes is again included and the new "Mazda Fairy" lights for decorative purposes are illustrated, as well as the "Mickey Mouse" and the "Snow-White" series. All matter relating to electric discharge lighting is printed on tinted paper—blue for the "Mercra" type of lamp, yellow for the "Sodra" type.

Photographs of the B.T.H. Co.'s works are also reproduced, together with examples of some of the company's lighting installations. This season's descriptive general folder is enlarged and has a central spread presenting a coloured photograph of the "Mazda" range. A special folder giving details of car bulbs. The "Mazda Business Guide" is a handy pocket-size book of reference for the whole range of "Mazda" lamps, as well as a selection of industrial lighting equipment. It also contains a description of the B.T.H. light meter discount tables, &c.

Edison Swan Electric Co., Ltd.

ANOTHER short, but telling, phrase—"Let's see"—forms the keynote of "Ediswan" publicity for the 1939/40 lighting season. All display material features it and a National Press campaign will be built around it. In conjunction with this slogan, a charmingly composed picture of a girl reading, reproduced in twelve colours on the large window display

The three main pieces of the new "Ediswan" display materials

centre-piece, the smaller counter display and the squared-up show card, suggests that one may discard one's reading glasses if "Royal Ediswan" lamps are in the holders. In fewer colours it supplies, too, the covers for both the lamp catalogue and the domestic lamp folder.

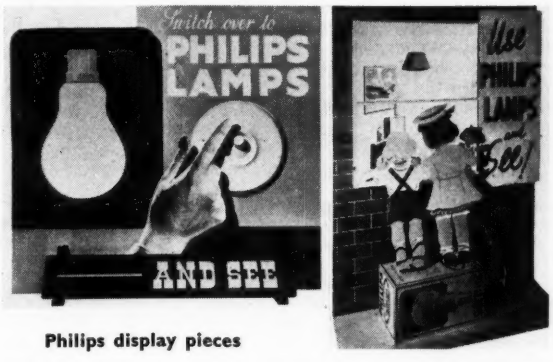
For the sale of motor lamp bulbs, the company is again emphasising "precision focusing," introduced last year. A window bill printed entirely in blue portrays a night scene very effectively. The truly aligned headlights shown might tempt any motorist to try the experiment of renewing his lamps.

The type "B" showcard, which is about 25 in. high, relies upon boldness of design and colouring. The trade name is in yellow shaded with orange, the background deep blue, the "shilling" silver, embossed in the centre, and the lamp natural. Other items are the motor lamp data showcard, motor lamp fol-

der, type "B" lamp folder and illuminated box signs. More reflex road signs will flash out their permanent reminders of "Royal Ediswan" lamps, while in Leicester Square the new and greatly enlarged sign—believed to be the largest animated neon sign in the world—is seen by 750,000 people a day.

Philips Lamps, Ltd.

THE design of the 16-sheet poster which forms one of the main features of this year's campaign depicts a red roof covering an electric lamp, with an all-over background of deep



Philips display pieces

sky blue. The poster campaign covers the whole of the provinces, Scotland and Wales. In the new window displays available on loan effective use has been made of lighting by lamps inserted at the back, and in one a lamp lights up as a hand swings across to it. The "Press and Compare" display is available in an improved and more compact design. A counter unit is designed to hold eight 60-W pearl lamps in cartons and a supply of leaflets. Two lamps can also be wired up on the top. A window display unit is also in course of production for Philips motor bulbs. New price cards of improved design are available, as well as a striking window pelmet. The company's outside sign, representing a pearl "Arlita" lamp carton, is being continued. Literature and sales-aids include a general lamp catalogue, Group 1 and Group 2 leaflets, type "B" leaflets, "Philidyne" cycle-lighting set leaflets, fittings catalogue, &c. The Philips handbag mirrors and pocket note-books have been reintroduced.

Crompton Parkinson, Ltd.

A REALISTIC reproduction of a hand holding a large Crompton carton forms the basis of two effective display pieces. "For Long and Brilliant Service" reads the caption on the first display, 48 in. high by 36 in. wide: the same slogan is used on the posters. Of similar design a counter show-piece invites customers to "Keep a 'Spare' Handy."

In its National Press advertising the company has decided to return to its well-known "hat" campaign. The design of the first of this series, which will also be the basis of the poster, depicts two Crompton lamps, one "sporting" an officer's cap, the other that of a pensioner. The "hat" idea

Crompton counter showpiece and "Kye" showcard

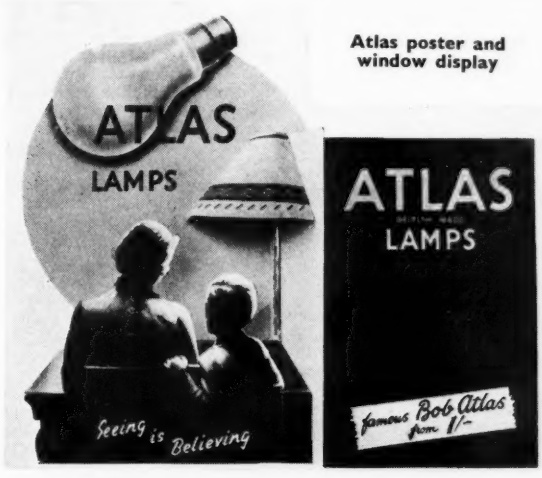
is also the basis of the counter leaflet design. The new lamp and lighting unit price catalogue has been enlarged and improved, while a sales assistants' book contains details of all the principal lamps. Two large illuminated cabinet displays, measuring 4 ft. 6 in. by 6 ft., when fully extended, have their backgrounds picked out by various types of lamps.

This season the company is marketing automobile lamps, and has produced a comprehensive folder with the slogan "Crompton turns night driving into light driving"—an idea "put over" by the contrast between the illustrations.

On the "Kye" side there will be a cut-out display 40 in. by 20 in. in two planes and printed in six colours. Tying up with it is a counter leaflet container printed in eight colours. A showcard realistically depicts a pearl and clear lamp: the pearl lamp has "Cellophane" stretched across the face to give an impression of glass, while the clear lamp has a reflector fitting upon which the filament is drawn. A window bill is based on the background design of the two principal displays.

Thorn Electrical Industries, Ltd.

THE coming season's publicity scheme for "Atlas" lamps is being extended in many directions. Full pages, followed by big spaces in national and provincial media, are being booked and will be supported in the trade Press. The company's new coiled coil lamps are being introduced and the publicity will cover display and poster publicity in addition to general advertising. Sixteen-sheet posters will be displayed throughout the country, and attractive show material and special window displays are being arranged. In addition, dealers will be supported by colourful lists. An illustrated 28-page catalogue covers every type of lamp. New sales aids include an attrac-



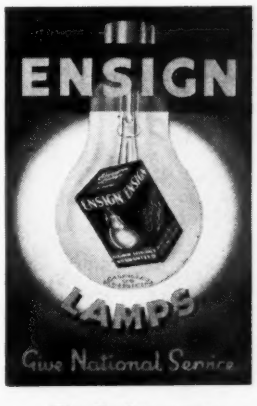
Atlas poster and window display

tive window piece, an electric clock, a flashing display sign, coloured counter cut-outs, leaflet containers, showcards, &c.

Ensign Lamps, Ltd.

WITH a letter headed "We Mean Business" there has been mailed to all wholesalers and retailers of "Ensign" and "Ribble" lamps, a copy of an illustrated trade broadsheet and a dealer requisition card. The campaign outlined in the broadsheet is far more comprehensive than in previous years and carries a stage further the "Ensign Square Deal Trading Policy."

Commencing on September 4th, posters, depicting in striking colours an "Ensign" lamp with the topical inscription "Give National Service," will appear on thousands of main road sites. The same design is used on a transparency. The centrepiece for the "Ensign" window display again features the "National Service" appeal, one of the lions at the foot of Nelson's Column being shown holding an "Ensign" lamp. Two smaller cut-out displays for window or counter use are available.



The Ensign poster

For the "Ribble" window display there is a centrepiece showing a lamp carbon surmounting a globe round which are the words "Span the World with Better Light." Again two smaller displays are obtainable. A window display has also been prepared incorporating the complete "Ensign" and "Ribble" ranges. Window pelmets, counter leaflets, rubber cash mats and dealers' accumulator tags are other materials provided.

To meet the increased demand for lamps the new 60,000-sq. ft. extension to the works has been maintained in full production throughout the summer.

PERSONAL AND SOCIAL

Information regarding new appointments and other matters of interest for this page are welcomed

IN view of the present situation it has been decided to postpone the playing of the London and Home Counties Area final of the E.I.B.A. Golf Competition at Sandy Lodge on September 1st. All competitors are asked to retain their tickets and papers of instruction in their possession and further communications will be sent in due course.

Mr. H. W. Swann, A.M.I.E.E., has accepted the invitation of the Executive Council of the Association of Supervising Electrical Engineers to be the president of the Association, and will take office in October next on the retirement of **Mr. J. R. Beard,** M.Sc., M.I.E.E., who has been president of the Association for the past two years. Mr. Swann is well-known as H.M. Senior Electrical Inspector of Factories, in which capacity he advises the Factory Department of the Home Office on a wide range of electrical subjects, including the electrical aspects of A.R.P. Born in Cambridge in 1883, he was educated at the Perse School before going to Faraday House in 1902 for his technical training; he has maintained his interest in the College, where he lectures occasionally, and was president of the Old Students' Association in 1936.

Mr. H. W. Swann

After some manufacturing experience Mr. Swann went in for supply work and held appointments with the Metropolitan Electric Tramways and the North Metropolitan Co. before becoming a Home Office Inspector in 1922. In 1930, on the retirement of Mr. G. Scott Ram, a late president of the Association, Mr. Swann succeeded to the position he now holds at the Home Office. Mr. Swann tells us that one of his most interesting jobs has been the study of electricity in surgery and medicine, in connection with work for the Ministry of Health, and he contributed an article on the electrical regulations for anæsthetics to the British Medical Journal in 1938. He also advises his Department on electricity in cinemas. Some of the electrical A.R.P. problems will be described by him in his presidential address, which will be delivered at the Association's meeting at the Lighting Service Bureau, London, on October 19th. Mr. Swann is a member of the General Council of the B.S.I., and will join the Council of the I.E.E. in October. He serves on numerous committees of both Institutions.

Mr. F. Jones, of Liverpool, has been appointed telephone manager for the York Area in succession to **Capt. H. A. Berry,** now Controller of Telecommunications at Belfast. Mr. Jones, who has been area engineer at Liverpool since November, 1937, entered the service of the Post Office as an inspector in 1923.

Mr. S. Mills has been appointed manager of the new branch of Ellison Insulations, Ltd., which is being opened to-day (Friday), at Kent House, 21, Spring Gardens, Manchester, 2 (telephone: Deansgate 5105). He will be assisted by **Mr. J. Burns** and **Mr. A. W. Manning.** The new branch will control all the selling arrangements for "Tufnol" in the North from Chester to the Wash.

Mr. S. Mills

Dr. L. G. A. Sims, M.I.E.E., head of the Department of Electrical Engineering at the Northampton Polytechnic Institute, London, E.C.1, has been appointed Professor of Physics and Electrical Engineering at the Royal Naval College, Greenwich. He takes up his new duties this week and will be succeeded at the Northampton Polytechnic by **Dr. J. Greig,** A.M.I.E.E., who is at present on the staff of the Electrical Engineering Department of the University of Birmingham.

Mr. E. D. Ruddle, of Calder Avenue, Walsall, who is secretary of Crabtree Electrical Industries, Ltd., Lincoln Works, Walsall, was married recently at Camberwell to Miss Lilian Crighton.

Mr. J. E. Collins, of Peterborough, has been appointed by Darwen Electricity Committee, to the position of first mains assistant. Mr. Collins, who has been assistant mains engineer at Peterborough for the last two years, will take the position recently vacated by Mr. J. L. H. Johnson.

Mr. R. C. Roberts has been appointed sales engineer for the electric cooking and heating department of Carron Company and will be responsible for the London area south of the Thames, together with the southern counties. He takes up his duties immediately.

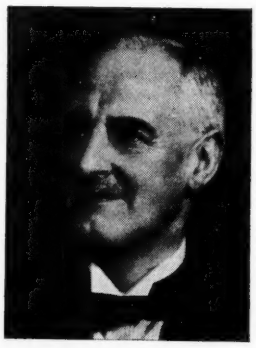
Mr. A. Clifford, who for the past forty years has been associated with the Nottingham City electricity undertaking, and for the past seventeen years has been deputy city electrical engineer, retired on August 18th. His successor is **Mr. M. Wadeson,** M.I.E.E.

Mr. A. Kingwell has been transferred to the new London depôt of B.E.N. Patents, Ltd., at 92, Tottenham Court Road, as London area manager.

On August 26th, a new sports pavilion was opened on the ten-acre sports ground of the Ipswich Electric Supply and Transport Sports Association in Lindbergh Road, Ipswich. The accommodation includes flats for steward and groundsman, six dressing rooms, shower baths, billiard room, dance hall, kitchen, canteen, and refreshment rooms. **Mr. G. A. Vowles,** borough electrical engineer, and **Mr. H. E. Blackiston,** former borough electrical engineer, were present at the opening.

OBITUARY

Mr. R. E. Robson.—We regret to record the death of Mr. Robert Edward Robson, M.I.E.E., sole proprietor of Robson & Coleman, electrical engineers, of Newcastle-on-Tyne, which occurred as the result of an accident while on a steamship journey. Mr. Robson, who was sixty-two years of age, was educated at Newcastle Modern School, and received his training at Rutherford and Armstrong Colleges, Newcastle-on-Tyne. He served his apprenticeship with J. & G. Joicey & Co. (1891-1893), and with J. H. Holmes & Co. (1893-1898). In 1898 he commenced business as an electrical engineer, and in 1903 Mr. A. C. Coleman became a partner. The partnership was dissolved in 1911, after which Mr. Robson became sole proprietor of the firm.



[Lafayette

The late Mr. Robson

He had taken a leading part in the activities of the Electrical Contractors' Association, of which he became a member on its formation in 1901, and had been hon. secretary of the Northern Section and a member of the Council of the Association for over twenty-five years. He was president in 1923-24, and was elected a Fellow in 1924. Mr. Robson had also been a member of the North Eastern Area Advisory Committee of the E.I.B.A. since its formation in 1919, and was a past chairman of the North Eastern Area of E.D.A. He became an A.M.I.E.E. in 1903 and a full member of the Institution in 1923.

Mr. H. Roberts.—We learn with regret that the death occurred in hospital, on August 18th, at the age of thirty-six, after a long illness, of Mr. Hugh Roberts, one of the assistant secretaries of the Electrical Power Engineers' Association. Prior to his appointment as an official of the E.P.E.A. he held a position on the technical staff of the Northampton Electric Light and Power Co. Apart from his official duties as a member of the secretariat, in which he displayed the utmost enthusiasm, his natural flair for journalism was early recognised by the Association as shown by his appointment as one of the assistant editors of the *Electrical Power Engineer.* For seven successive years he was the winner of the premier award for the chief scientific essay set at the Royal National Eisteddfod of Wales.

Mr. J. Corfield.—We regret to have to report the death of Mr. John Corfield, chairman and managing director of Corfield-Sigg, Ltd., which occurred suddenly, on August 22nd, at the company's works, Merton Abbey, London, S.W.19. Mr. Corfield was also chairman and managing director of Corfield-Buckle, Ltd., and Hancock & Waller, Ltd., and was a director of the British Rototherm Co. A memorial service was held on Saturday last at the St. Lawrence, Morden, Parish Church, and afterwards at Woking.

Mr. T. J. Brown.—The death occurred at Perth on August 25th of Mr. Thomas J. Brown, principal of Anderson & Munro, Ltd., electrical engineers of George Street, Perth.

Will.—Mr. T. B. Pearson, chairman of the Pontypool Electric Light & Power Co., left £25,979 with net personalty £23,196.

NEW BOOKS

Clock Design. Experiments in Magnetism. Running a Factory

Modern Electric Clocks. By STUART F. PHILPOTT. Third edition. (Pp. 214, figs. 152.) Price 7s. 6d. Sir Isaac Pitman & Sons, Ltd., Parker Street, Kingsway, London, W.C.2.

A TEXTBOOK which achieves its third edition in under five years is certain to be a soundly written work, and Mr. Philpott's little volume clearly merits this description.

In the chapter dealing with household models of synchronous clocks, the addition of the Smith *de luxe* type movement and the revised notes on the alarm movement are welcome, as are also the good descriptions of the striking and quarter-chiming models, but the more modern Smith "Bijou" movement is omitted, although it has been on the market for some time. The Ferranti illuminated alarm clock is another addition, and this clock is well described and illustrated, although the neat method of changing the bulbs when replacement becomes necessary seems to have escaped the writer. The Telephone Manufacturing Co.'s "Temco" clock is still shown in its older form, which is no longer made.

A miscellaneous applications section has been added to by the inclusion of time-switch notes. Mention of synchronous time recorders would not have been out of place as these are becoming more and more popular. The most serious gap in the book, however, remains that in the turret clock section. Several of the best-known makes are not mentioned, and the latest trends in design, both for master-clock released systems and synchronous-motor driven installations, are ignored.

The Post Office "Speaking Clock" time service is mentioned, but the notes are all too brief for one of the finest examples of electrical timekeeping ever constructed.

It is a pity that the omissions which were noted in the first edition have not been remedied, for in every other way the book is an admirable one. Its excellent illustrations, clearly expressed and easily understandable text, and the writer's concise style, which never becomes wandering or prosy, all combine to make the book very useful to both the beginner and the more advanced technician. It is often none too easy to reproduce an illustration of such a complex and compact mechanism as a clock with the necessary clarity, but it has been done consistently in this book.—T. R.

Modern Magnetism. By L. F. BATES. (Pp. 340; figs. 97). The University Press, Cambridge. Price: 16s.

In this book the author has set out with the chief purpose of describing fundamental experiments in magnetism, reserving the right, however, to present the tenets of modern magnetic theory as and where it may seem to him to be desirable so to do. On the whole, the result is quite a happy one, although perhaps the primary objective is sometimes lost sight of in what seems to be the author's preference for the mathematical aspects of the problem. We have a good deal of sympathy with this tendency, however, for the study of magnetic phenomena has reached the stage where it should be the subject of intensive co-operative research by the pure, mathematical and applied physicists, the metallurgist, the chemist and the electrical engineer. The advances which have been made in all these branches of scientific activity demand recognition in the form of co-ordinated effort when attacking so fundamental a problem as magnetics.

The first three chapters of the book deal with fundamental conceptions, the production and measurement of magnetic fields, and susceptibility measurements with isotropic substances. The next four relate more particularly to the bearing that atomic physics has upon magnetic phenomena and they describe the magnetic properties of crystals, experiments with single particles, nuclear spins and magnetic moments, and gyromagnetic effects.

The engineer will probably be more interested in the last three chapters, which deal with magnetic saturation and equation of state, energy changes associated with reversible magnetism, and magnetostriction. Concerning the last-named phenomenon, there is still a lot to be said and researches going on elsewhere have shown it to be responsible for quite unanticipated effects.

The book is a very useful presentation of the work done on the experimental side of the subject, especially as it includes much of foreign origin. It might well be studied along with Francis Bitter's "Introduction to Ferromagnetism" (1937), for the two are distinctly complementary.—S. A. S.

Factory Administration in Practice. By W. J. HISCOX. Revised by JOHN R. PRICE and JAMES STIRLING. Pp. 300; figs. 98.) Sir Isaac Pitman & Sons, Ltd., Parker Street, Kingsway, London, W.C.2. Price: 8s. 6d.

This book, now in its fifth edition, is the outcome of a trinity of effort. It was written originally by Mr. W. J. Hiscox as a practical book to appeal to the factory man, with particular reference to the progress function. In the second and subsequent editions, produced by Mr. J. R. Price, sections were added dealing in outline with factory buildings, plant and materials, and labour administration, and the work itself was revised to make it more suitable as a tutorial medium. In this latest edition, in the absence abroad of Mr. Price, Mr. James Stirling was commissioned by the publishers to revise and amplify the work further. His aim has been to ensure that the book will fill the function of textbook for professional examinations in the subjects of factory administration, organisation and management.

The original book now represents about two-thirds of the volume in its present form. The reader is shown how an inquiry is dealt with in a typical engineering firm and how the subsequent order is interpreted in terms of specification lists or working instructions, with the implied requirements for jigs, gauges, tools and patterns, and the associated work of rate fixing and process planning. The author then shows how the job is planned and routed in its individual parts with reference to delivery commitments, available production facilities, and the time involved in the production of each part or assembly. Descriptions are given of the clerical systems used to follow the progress of the work through the various operations and to facilitate "chasing" those jobs that fall behind schedule or are expected to do so.

In Mr. Hiscox's interpretation this progress function also embraces storekeeping, purchasing, internal transport, inspection, packing and dispatch, so that the progress manager controls the situation from the receipt of the order to the dispatch of the goods. In actual fact the progress manager's scope is rarely so wide, but this fact does not in any way detract from the value of the book as a good elementary textbook on factory administration.—A. W. W.

Intermediate Engineering Drawing. By A. C. PARKINSON. 2nd ed. (Pp. 186; figs. 323.) Sir Isaac Pitman & Sons, Ltd. Price: 7s. 6d.

This book is intended for students in the second year of national certificate courses, and also for students preparing for the intermediate B.Sc. (Eng.) examination of the University of London, and the probationary inspector's examination of the G.P.O. In this, the second edition, only minor emendations have been made throughout the text, but some additional exercises, with notes on their solution, have been provided. The general plan is, therefore, substantially the same as in the first edition, which appeared in 1936 and, as reprints were necessary in 1937 and in 1938, the author's presentation may be considered to have satisfied the needs of those for whom it was intended.

The subject-matter is divided into three parts:—(I) Conventional geometry, (II) engineering drawing, and (III) exercises. Part I gives the student some useful hints on drawing technique, including the dimensioning of drawings. Loci and projection are then dealt with in considerable detail. In Part II after riveted joints and fastenings there is a very brief note on oxy-acetylene, and electric welding is referred to only in a short paragraph. In view of the modern practice of fabricating bedplates, large pedestal bearings, stator frames, &c., by electric welding, surely one example of a welded machine part could have been given. In future editions we hope that some of the time-honoured riveted joints and machine parts will be replaced by some modern examples of welding practice. Part III comprises 33 pages of drawing examples, the majority of which are taken from examination papers of the University of London [B.Sc. (Eng.)] and the Post Office.

A student who works conscientiously through Parts I and II will obtain a good grounding in the elements of drawing-office practice and if, in addition, he works through all the examples in Part III he should be well on the way to becoming a competent draughtsman. The whole of the drawings and sketches throughout the book are of a high and uniform standard.—A. T. D.

Shorter Notices

"Practical Aspects of Retailing," by James L. Courtney (pp. 142). Price: 3s. 6d. Faber & Faber, Ltd., 24, Russell Square, London, W.C.1.—Written in a straightforward, concise style this book should be a useful guide to efficient trading. The author illustrates the value of statistics and shows how graphs can be utilised with advantage. Other matters dealt with include display problems, advertising and circularising, making accounts informative, buying and delivery service.

"Theory and Design of Valve Oscillators," by H. A. Thomas. (Pp. 270; figs. 103.) Price 18s. "Fundamental Theory of Arc Convertors," by H. Rissik. (Pp. 283; figs. 78.) Price 18s. "Electrical Engineering Experiments," by H. R. Reed and G. F. Corcoran. (Pp. 500; illus.) Price 22s. 6d. Chapman & Hall, Ltd., 11, Henrietta Street, London, W.C.2.

"Handbook to the Factories Act and Truck Acts," by J. Owner (2nd ed.). (Pp. 151.) Price 5s. Sir Isaac Pitman & Sons, Ltd., Parker Street, Kingsway, London, W.C.2.

"First Steps in Machine Drawing and Design," by L. A. Johnson. (Pp. 80; figs. 56.) Price 1s. 6d. Pitt's Popular Publications, 56, Talfourd Road, London, S.E.15.

"Principles of Mechanism," by F. Dyson. 3rd ed. (Pp. 364; figs. 183.) Price 12s. Oxford University Press, Amen House, Warwick Square, London, E.C.4.

BRITISH ASSOCIATION

Meeting at Dundee

THIS year's meeting of the British Association for the Advancement of Science opened at Dundee on Wednesday evening with the inaugural address of the President, Sir Albert Seward. Sectional meetings started yesterday morning, when Dr. H. E. Wimperis, president of Section G (Engineering) took as the subject of his address "The Future of Flying." In the technical aspect the most striking features of progress in the last few years he regarded as the reduction in weight per HP of engines, the increase in wing loading per. sq. ft., and effect of stream-lining. The limitations imposed by nature on speed he showed to be not without its beneficial implications having regard to present international conditions.

Mr. R. S. Whipple, president of Section A (Mathematical and Physical Sciences) chose "Instruments in Science and Industry" as his theme. After a historical survey he reached electrical methods of measuring temperature. The industrial field of the resistance thermometer, he said, was now usually limited to temperatures below 500 deg. C., more particularly when a group of temperatures was required to be read from one central position.

While the costly platinum-rhodium couple was most generally used in accurate high-temperature work, cheaper base-metal couples (which yielded a high EMF) largely met requirements and nickel-chromium could be used up to 1,200 deg. C. With very few exceptions, no heat treatment was now given to any material in a manufacturing plant without automatic control. This had called for temperature measuring instruments that were not placed in the hot-zone, the most usual of which was that due to Holborn and Kurlbaum, in which a small incandescent lamp was interposed between the observer and the hot body and the current adjusted until the filament became invisible against the hot body.

Another common type with a wide range was the Fery pyrometer; this consisted of a thermo-couple of small mass mounted in the focus of a concave mirror which focused the total radiation received from the hot body on to the couple. It could be attached to a recording galvanometer in order to follow the stages in the heat treatment. The sensitivity of galvanometers was so great that there was said to be a definite limit set by Brownian motion.

In the form of a moving-strip type of electro-magnetic oscillograph, the latest models had a natural frequency in air of 1/17,000 sec. and a sensitivity of 42 mm. at one meter for 0.1 A, DC, or with a frequency of 1/3,000 sec., a sensitivity of 580 mm. at one meter for the same current—a sensitivity ten times that possible five years ago. The writing speed of the spot in the cathode-ray oscillograph that directed its beam on to a photographic plate was about one-third the velocity of light.

The thermionic voltmeter was one of the first measuring instruments to employ directly a valve, which gave rectification, amplification, rapidity of response and high impedance. The first two qualities enabled AC values as small as 10^{-4} A and 10^{-4} V to be measured, using a robust moving-coil instrument as a direct reading indicator. Its low electrical inertia and high-input impedance had, with diode valves, enabled voltages and frequencies up to 100 megacycles to be measured with reasonable accuracy by commercial instruments.

In the same section was included a paper by Dr. V. K. Zworykin on "Electron Optics and Television," which referred to the value of the low-velocity iconoscope in combining a great increase in operating efficiency with elimination of the normal spurious signal. Signal-to-noise ratio of the received picture, he said, could be improved by adapting a secondary emission multiplier for use with the iconoscope. Television technique had also produced the scanning microscope.

In another paper Mr. A. B. Howe described the development of television outside broadcasts. For this purpose a scanning van, or mobile control room, was linked with Alexandra Palace and used in three ways. In the first (radio-link method) a record van contained an ultra-short-wave transmitter, from which vision signals were received at Alexandra Palace and re-radiated. The second method (cable-link) employed a balanced low-capacity underground cable which ran from a number of points in Central London to Alexandra Palace, *via* Broadcasting House. In the third method the scope of the cable link was increased by extending its length by up to two or three miles by the use of telephone cable as in the case of outside sound broadcasts.

The president of the Educational Section is Dr. A. P. M. Fleming. He was to deliver his address on "Education for Industry" yesterday (Thursday) morning.

Northern Ireland Electricity Scheme

Proposed Duplicate Power Station

OUR Belfast correspondent reports that the Electricity Committee of the City Corporation is considering the provision of a duplicate power station at an estimated cost of over one million pounds. Strong representations are being made by the Northern Ireland Government, in view of the Civil Defence scheme, to secure a site for a duplicate station some distance from Belfast and various places have been mentioned including Carrickfergus, Donaghadee and Larne Harbour. The matter is regarded as one of extreme urgency by the Government, and last week Mr. W. D. Scott, Permanent Secretary to the Ministry of Commerce, met a sub-committee of the Electricity Committee to discuss the question with particular regard to a site.

The existing large Belfast Harbour electricity station under the control of the Corporation not only supplies Belfast but the greater portion of Northern Ireland with electricity, high-voltage lines running as far as Newry and joining in a grid system with the Londonderry power station. It is felt by the Government that if the Belfast station is put out of action during a war the greater part of the industrial activity of Northern Ireland would be crippled. Hence the anxiety to secure as quickly as possible a large supplementary generating station.

A plan to extend the existing power station has been under consideration for some time, but it is understood that the Government would prefer the erection of a duplicate station rather than the extension of the present Harbour station. A site is required which would be suitable for the shipment of coal, and it is hoped to find one where coal can be shipped in 5,000-ton loads.

The Electricity Committee of the Corporation has already accepted the principle of purchasing new plant before the site is found, and it may seek the Corporation's approval to an expenditure of over £300,000 at an early date on the new plant. The Northern Government will be asked to give a substantial grant for the erection of a new station under the Civil Defence scheme.

As an additional precaution it has been suggested that the Northern Ireland system could be linked up with the Shannon scheme to the advantage of both. It has been pointed out before that a water-power scheme like the Shannon and coal generating plants such as exist in Northern Ireland are complementary. In the winter months the hydro-electric system generally has a surplus of electricity for disposal and in the summer months the coal generating plants could be drawn upon. A connection between the Shannon and Northern Ireland schemes could be effected in the vicinity of Newry.

Commenting on the suggested link between the Northern Ireland and Eire systems the *Irish Times* (Dublin) agrees that such a step would be of mutual advantage. If such an agreement could be brought about, it says, it would solve one of the major problems that would face each country in time of war. "Without further ado, to say nothing of expense, it would provide both North and South with the alternative supplies that each of them so urgently requires."

Architectural Lampholders

A NEW British Standard Specification, No. 841, for architectural lamp-caps and lampholders just issued gives details of the dimensions of the caps for 30 mm. and 40 mm. diameter tubular lamps, and prescribes the essential requirements for the corresponding lampholders from the point of view of safety and interchangeability. Copies of the specification may be obtained from the British Standards Institution, 28, Victoria Street, S.W.1, price 2s. 2d. post free.

COMMERCIAL and INDUSTRIAL NEWS

War-time Shop Lighting. South African Trolley Bus Order. Cable-makers' Hours. Scottish Co-operative Lamp Factory Opened

New Irish Steel Works

MR. SEAN LEMASS, Minister for Industry and Commerce, last week inaugurated the new works of Irish Steel, Ltd., at Haulbowline, Cobh, Co. Cork. The machinery for the manufacture of the steel will be driven entirely by electricity. Main motors with a capacity of 2,500 HP have been installed and the electrical gear has been designed to facilitate the rapid handling of heavy weights, at the same time securing economy in transmission. There are scores of small independent drives and a number of electrically operated overhead cranes. Fitzgerald & Co., Ltd., Cork, had charge of the installation. The estimated annual output of the factory is 50,000 tons of merchant iron.

Shop Lighting in War Time

A simple structure (painted dead black) enabling shopkeepers to keep their premises open during all emergencies, and complying with Government regulations regarding artificial lighting, has been standardised by the British Standards Institution on the authority of the Home Office. Full particulars will be found in the specification, which can be obtained from the British Standards Institution, 28, Victoria Street, Westminster, S.W.1, price 3d. per copy.

Electric Vehicle Parade

There will be a special section for the cleanest and best kept electric goods vehicles of any weight in the annual parade of commercial motor vehicles, to be held under the auspices of the Commercial Motor Users' Association, at Belle Vue, Manchester, on September 23rd. Many cups and trophies will be offered for competition in the thirteen classes. This is the first time that provision has been made for electric vehicles, of which about 200 are in service in Manchester and district.

Lift Contract

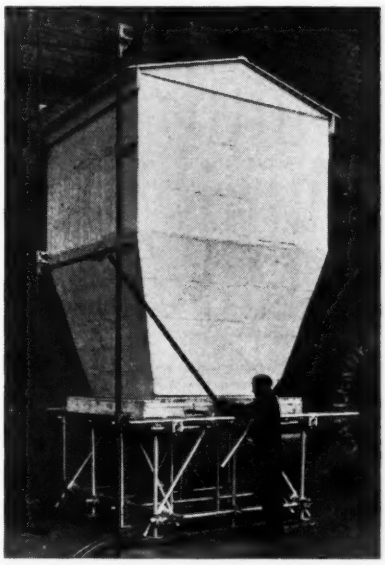
Bennie Lifts, Ltd., has obtained the contract for the installation of the lifts at St. George's House, New Oxford Street, London. These lifts will operate at 400 ft. per min. on a variable voltage system of control incorporating flying stop car switch and self-levelling. Both car and landing doors will be opened and closed by power-operated gear, and the cars themselves will be fitted with interconnected communicating car signalling indicators In view of the high speed at which these lifts operate rope compensating gear is being included in the installation, together with hydraulic buffers. The landings will be fitted with position indicators. The company has also succeeded in obtaining repeat orders from F. G. Minter, Ltd., in connection with 112, Cannon Street, 33, King Street and 71/2, Grosvenor Street, and a large contract for Hillier, Parker, May & Rowden at 76/8, Grosvenor Street.

Safety in Industry

Closely following publication of the annual report of the Chief Inspector of Factories comes news of a number of interesting additions to the safety exhibits at the Home Office Industrial Museum in Horseferry Road, London, S.W.1. The new exhibits take the form of a series of transparent plastic guards fitted to machinery ranging from high-speed power presses to textile and woodworking machinery, printing machines, abrasive wheels and polishers. Among the most interesting is a Rhodoid interlocking safety guard on a Rhodes power press which, in addition to providing eye safety, gives protection from limb injury by an automatic locking device. A further device includes a motor-car type windscreen wiper fitted to a power press guard to improve vision.

Sealing End Testing

In developing extra high voltage cables and accessories, misleading results are sometimes obtained if the cable sealing ends which are under development test are erected inside the laboratory, since it is now known that low temperature is particularly liable to affect the performance of e.h.v. sealing ends. In order to meet this condition, Callender's Research Laboratories, Wood Lane, London, have installed (and claim to be the first to do so) a refrigerating chamber large enough to accommodate cable sealing ends for the highest voltages while these are running under high voltage test. The thermal insulation consists of 6-in. of expanded rubber. Refrigeration is obtained by introducing into a tray at the top of the chamber 100 lb. of solidified CO_2. In this way a temperature of −15 deg. C. is reached. The illustration shows the thermal insulated cover which is lowered into position over a pressure type sealing end undergoing a long time stability test at 300 kV with daily heat cycles superimposed.



Refrigerating chamber of Callender's Research Laboratories being fixed in position for the sealing end

Contracts for Bus Bodies

The English Electric Co., Ltd., has received a contract for a number of single-deck bus bodies from the Lancashire United Transport and Power Co., Ltd. In addition, repeat orders have been received from Warrington Corporation for double-deck all-metal bus bodies, from Preston Corporation for double-deck composite bus bodies, and from the Potteries Motor Traction Co., for single-deck composite bus bodies. These contracts will be carried out at the English Electric Co.'s Dick Kerr works, Preston.

Members of the Institution of Railway Signal Engineers at the works of the D. P. Battery Co., Ltd.

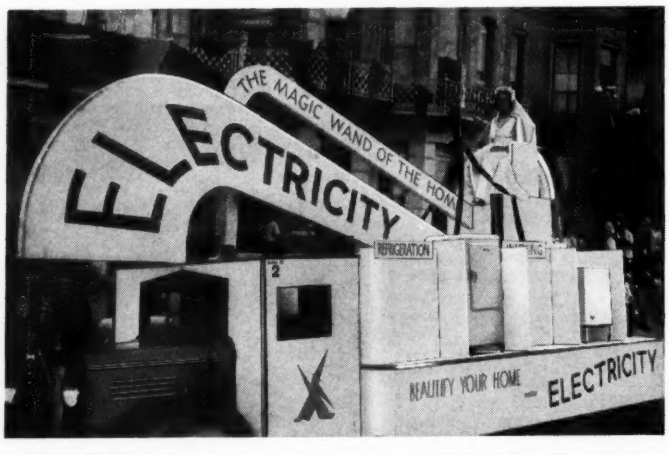
Works Visit

During the recent summer meeting of the Institution of Railway Signal Engineers members made a tour of the Peak District, during the course of which they visited the works of the D.P. Battery Co., Ltd., at Bakewell. After inspecting the works the visitors were entertained to tea by the company. Our picture shows members of the Institution at the company's works.

Westinghouse Domestic Appliances

A change of marketing policy is announced for small Westinghouse domestic appliances. For several years these have been distributed under a limited dealership scheme, but in future the restrictions will no longer apply and the various products will be distributed through normal trade channels to all retailers, contractors and supply authorities. Applications for details of the new marketing plan are now being invited. The change in policy applies only to small lines such as the "Silver Arrow" irons, vacuum

cleaners, coffee percolators and other domestic appliances of the company. Limited dealership agreements on the larger products, including refrigerators, washing machines and dishwashers will continue as before. The change of policy follows an announcement that the Lightfoot Refrigeration Co. has mutually agreed with the Westinghouse Electric International Co. to relinquish its concession to distribute Westinghouse products in Great Britain. In future all business in Westinghouse products will be handled by the Westinghouse Co. from its head office at 2, Norfolk Street, Strand, W.C.2. Mr. T. V. S. Skinner has recently arrived from the United States to take over the duties of regional supervisor of the company, and the new department for domestic electrical appliances is now under his direction. New prices for Westinghouse domestic refrigerators, washing machines, ironers, dish washers and irons are announced.



Prize-winning tableau entered by Eastbourne Electricity Department in a local carnival

Trade Announcements

The V.G. Manufacturing Co., Ltd., has appointed the following representatives to deal with its sticky thread product: Mr. F. G. Lawrence, 104, Overcliff Drive, Southbourne, Bournemouth (South Western Counties); Mr. D. G. Barrie, 24, Middleton Avenue, Hove, (South Eastern Counties, London, including Middlesex); Mr. E. Jones, Deansgate House, 274, Deansgate Manchester (Lancashire, Cheshire and North Wales); Mr. J. W. Riddiough, New Way, Tranmere Park, Guiseley, nr. Leeds (Yorkshire and North Eastern Counties).

Power Specialities, Ltd., makers of the "Rotoscythe" power vacuum mower, will in October transfer their works from Maidenhead to larger premises now being built at Slough on land purchased from the Eton College authorities. Increased space is also required for the production of a new line that the company will introduce shortly. This is a 120-c.c. blower-cooled two-stroke engine, to be known as the "Power Pup." It will be fitted in the standard model "Rotoscythe" and is also suitable for other implements requiring a power unit of this size or for stationary use. The company's new address will be Power Specialities, Ltd., Rotoscythe Works, Bath Road West, Slough, Bucks.

Next Year's B.I.F.

The Department of Overseas Trade announces that free passport visas will be given, in cases where a charge is normally made, to overseas buyers visiting the British Industries Fair, which opens in London and Birmingham on February 19th, 1940. The visas will be valid for three months from the date of issue and the concession includes wives of buyers and their children under eighteen years of age even if travelling with separate passports. Among the principal foreign countries which will benefit from the concession are China, Ethiopia, Germany, Iceland, Japan, Palestine, Poland, Russia and the United States of America. Citizens of Danzig are also included.

A.S.E.E. Programme

The 1939-40 session of the Association of Supervising Electrical Engineers will open on October 17th, when Mr. H. W. Swann will deliver his presidential address. The arrangements for the remainder of the session are as follows:—October 31st: "The Eleventh Edition of the I.E.E. Regulations for the Electrical Equipment of Buildings," by Mr. E. A. Reynolds. November 21st: "Electricity as Applied to Mining," by Mr. D. M. Rait. November 29th: "The Practice and Principle of Discharge Lighting," by Mr. R. O. Ackerley. December 19th: "Switchgear," by Mr. R. T. Lythall. January 16th, 1940: "The Development of Sound Equipment," by Mr. D. T. Bennett. February 20th: "The Theory and Practice of Electric Water Heating," by Messrs. T. A. Mugford and N. S. Richardson. March 19th: To be arranged. April 16th: "Factory Electrification," by Mr. G. H. Buckle. With the exception of the meeting on November 28th, which will be held at Magnet House, Kingsway, W.C.2, the meetings will be held at the Lighting Service Bureau, 2, Savoy Hill, London, W.C.2. The annual dance and cabaret will be held on October 28th at the Westminster Palace Rooms, Victoria Street, London, S.W.1, and the annual dinner and reunion will be held at the Trocadero Restaurant, London, W.1, on February 24th.

A Carnival Tableau

The accompanying illustration shows a tableau entered by the Eastbourne Electricity Department in the recent local carnival and awarded first prize. The "Fairy Queen" was one of the showroom staff, and when the procession was in motion she waved a wand from which four red ribbons led directly down to a cooker, water heater, refrigerator and washing machine.

Trolley-bus Equipment for South Africa

The Passenger Transport Department of the Durban Corporation recently decided on a further important addition to its fleet of trolley buses, and an order has been placed for thirteen 70-72-seater, six-wheel, double-deck vehicles, the chassis and mechanical parts to be supplied by Leyland Motors, Ltd., and the electrical equipment by the General Electric Co., Ltd. This is the third occasion on which G.E.C. electrical equipment has been specified for Durban trolley-buses, and the new vehicles will be duplicates of those ordered three months ago. Each trolley-bus will be equipped with a 100-HP compound-wound traction motor, type W.T.26, with electro-magnetic control gear, circuit-breakers, resistances, trolley collector gear, &c. The equipment also includes both single-speed coasting and run-back brakes, lightning arrestor, and a radio suppression device; the system of control provides for efficient rheostatic braking and also a limited amount of regeneration.

Hours in the Cable-making Industry

Earlier in the year the Cable Makers' Association represented to the Home Secretary that certain provisions of Subsection 2 of Section 71 of the Factories Act, 1937, were fulfilled in the case of the cable-making industry and that the hours worked by young persons under the age of 16 should be permitted to exceed 44 per week. An inquiry was directed to be held into these representations but it is now announced that the C.M.A. has intimated that it does not wish to proceed further with the matter and its application for regulations has been withdrawn. The Home Secretary has, therefore, directed that the inquiry shall not be proceeded with and has appointed September 3rd as the date on which Section 71 shall have effect as respects factories in which the manufacture of insulated cables is carried on.

Scottish Lamp Factory

The new factory of the British Luma Co-operative Lamp Society, Ltd., at Shieldhall, Glasgow, was formally opened last Saturday. The factory, which has been built for a daily output of 9,000 lamps, is jointly sponsored by the Scottish C.W.S. and the Swedish Co-operative movement, and is the first international co-operative factory for the manufacture of electric lamps. Swedish technicians have trained the all-Scottish staff of factory workers, who number nearly 100. Designed and built by the S.C.W.S., the factory follows the lines of its Stockholm counterpart, and since production began some months ago there has been a daily output of 4,500 lamps, ranging from 15 to 200 watts in all general voltages.

Mr. D. Cameron Thompson, chairman of the Joint Committee, opened the factory. Among the speakers were Mr. Neil Beaton, president of the S.C.W.S., and Lord Provost Dollan, Glasgow. Congratulatory messages were received from leaders in France and other countries unable to attend because of the crisis. The Swedish expert, Mr. H. Schlott, has been appointed managing director and will spend part of his time in Scotland and part in Sweden. Mr. M. Hare is commercial manager and Mr. C. Norman production manager. The S.C.W.S. has obtained the site adjoining the lamp factory and is to erect works there for the building department.

Motor Purchasers' Responsibility

In the opening section of our "Motor Survey" in our issue of August 11th we attributed to Mr. Youngmark, of the English Electric Co., Ltd., the statement that: "Modern industry tends to put too much responsibility on the buyer with little or no technical experience." Mr. Youngmark points out that this does not fairly convey the general tendency which he indicated. The particular point which he desired stressed was that the purchaser should in his own interests explain to the manufacturer the purpose for which motors of large and medium outputs were required, giving particulars at the same time as to the conditions under which the motors would be required to work. The manufacturer could then offer machines adapted to those conditions. Often purchasers bought the cheapest motor obtainable having the output and temperature rise specified, irrespective of the fact that in many cases the

(*Continued overleaf.*)

conditions of service were such that the necessity for a specified type of motor was clearly indicated. If the manufacturer could be fully informed, trouble which might be experienced later could be avoided.

F.B.I. and the Crisis

The Federation of British Industries has issued a statement in which it says that it is intended to carry on the organisation in London unless the Government instructs it to move elsewhere. It is also intended, as long as possible, to keep in operation the district offices. The Federation was formed during the last war in view of the clear need to have a central body to act for industry. The same will hold good if war should break out now. It is felt that, in the event of war, the position that the Federation has gained during the last twenty years will make its services even more essential and valuable than during the last war.

United States Electrical Exports

So far this year there has been a slight decline in the overseas demand for American electrical machinery and allied material, the official returns for the six months ending with June last showing that the exports of such goods from the United States during that period attained a value of £49,140,000 as compared with £51,280,000 in the corresponding half of 1938, a decrease of 4.2 per cent.

Canadian Porcelain Import Regulations

Under a new regulation issued by the Canadian Government articles wholly of porcelain for electrical use imported into the Dominion must, as from November 1st next, be marked with the name of the country of origin.

A.R.P. Equipment

Air Defence Equipment Service, 4, Lisle Street, London, W.C.2, has published "The Cyclopædia of A.R.P. Equipment," a comprehensive guide to the equipment required both for individuals and business concerns. In addition to a list of material available the guide also gives details of its uses.

Prices of Materials

The following prices are only general, and they may vary according to quantities and other circumstances :—

	CHEMICALS, ETC.		Price August 30th	Fortnight's inc. or dec.
a	Acid oxalic	per cwt.	50s.	—
a	Ammoniac, Sal	per ton	£37	—
a	Ammonia, Muriate (large crystal) ...	,,	£18 10s.	—
a	Borax...	,,	£17	—
a	Copper, Sulphate	,,	£19	—
a	Potash Chlorate	per lb.	3¾d. to 4¼d.	—
a	,, Perchlorate	,,	6d.	—
a	Shellac	per cwt.	£4 8s.	—
a	Sulphur, Commercial	per ton	£11	—
a	,, Roll	,,	£11	—
a	Soda, Chlorate	per lb.	3¼d. to 3¾d.	—
a	,, Crystals	per ton	£5 to £5 5s.	—
a	Sodium, Bichromate, casks ...	per lb.	4¼d. net	—
	METALS, ETC.			
b	Aluminium, Ingots	per ton	£94	—
b	,, Wire	per lb.	1/1 to 1/9	—
b	,, Sheet and Foil ...	,,	1/2½ to 2/9	—
p	Babbits Metal and Anti-friction Metals—			
	Grade I	per ton net	£197	—
	Grade II	,,	£137	—
	Grade III	,,	£73	—
c	Brass (rolled metal 2" to 12" basis)...	per lb.	8¾d.	¼d. inc.
c	,, Tubes, (solid drawn)	,,	1/0½ to 1/0½	¼d. inc.
c	,, Wire, basis	,,	9½d.	¼d. inc.
c	Copper Tubes (solid drawn) ...	,,	1/1¼d.	¼d. inc.
g	,, Bars (best selected) ...	per ton	£86	£6 inc.
g	,, Sheet...	,,		
g	,, Rod	,,		
d	,, (Electrolytic) Bars	,,	£52	£1 10s. inc.
d	,, ,, Wire Rods ...	,,	£56 10s.	£1 10s. inc.
d	,, ,, H.C. Wire ...	per lb.	8⅛d.	⅛d. inc.
f	Ebonite Rod ½" dia. & up	,,	1/10 to 2/3	—
f	,, Sheet ⅛" thick & up ...	,,	1/4 to 1/8	—
n	German Silver Wire, Nos. 1 to 12 ...	,,	2/4	—
h	Gutta-percha, fine	,,	Nom.	—
h	India-rubber, Para-fine	,,	7¾d.	—
g	Lead, English Pig	,,	£18 10s.	£1 15s. inc.
g	Mercury	per bot.	£16 10s.	—
e	Mica (in original cases) small ...	per lb.	1/– to 2/6	—
e	,, ,, ,, medium ...	,,	7/6 to 15/–	—
e	,, ,, ,, large ...	,,	17/6 to 22/6 up	—
p	Phosphor Bronze, plain castings ...	,,	1/2½	—
p	,, ,, drawn bars & rods	,,	1/1½	½d. inc.
p	,, ,, rolled strip & sheet	,,	1/1¾d.	½d. inc.
p	,, ,, wire	,,	1/1⅝	½d. inc.
o	Platinum	per oz.	£8 15s.	£1 5s. inc.
d	Silicium Bronze Wire	per lb.	8¾d.	—
g	Spelter	per ton	£15 2s. 6d.	12s. 6d. inc.
g	Tin, Block (English)	,,	£230	—
n	,, Wire, Nos. 1 to 16	per lb.	3/9	—

Quotations supplied by :—

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India Rubber, Gutta Percha and Telegraph Works Co., Ltd.
g Henry Gardner & Co., Ltd.
h Edward Till & Co.
n P. Ormiston & Sons.
o Johnson Matthey & Co.
p C. Clifford & Sons, Ltd.

The above table is published here fortnightly. In alternate issues, in which it does not appear, the latest prices of copper, silicium bronze wire, lead, rubber, tin and spelter, up to the time of going to press, are given in this section under the same heading.

A Lubrication Contract

A contract to supply twenty-eight heavy-duty grease lubricators for the Malayan tin-producing industry has just been placed with C. C. Wakefield & Co., Ltd., of London. The lubricators, which have a total of over 400 feeds, are for use on dredge machinery, and it is claimed that this installation will simplify many of the present difficulties experienced in the lubrication of this type of equipment. They are electrically driven and will apply a forced feed of grease at high pressure to the various winch bearings of the dredgers, and in certain cases to the top and bottom tumblers and the ladder roller bearings; the feed of grease can be controlled for each individual point. Similar installations will be employed on a large gold dredge for use in New Zealand.

Temporary Removals

Owing to the uncertainty of the political situation, a number of concerns have thought it advisable to take temporary accommodation out of London.

All communications to Mr. F. W. Purse, chief engineer of the London and Home Counties J.E.A., should be addressed to Chief Engineer's Department, Testing and Record Depot, Burford, Dorking, Surrey.

The Institute of Fuel announces that in view of the present state of emergency the more important Institute records have been removed to Stangrave Hall, Godstone, Surrey, from where the affairs of the Institute will be conducted until further notice.

Stockholm's Large Neon Clock

The largest revolving neon sign in Europe, a clock that weighs seven tons and measures 24 ft. in diameter, will be seen all over Stockholm from its place on the "Telephone Tower" in the centre of the city from the beginning of September. This clock which is being built by the Ericsson Co. will be illuminated in red and the whole clock will revolve four times a minute.

Catalogues and Lists

Ward & Goldstone, Ltd., Frederick Road, Pendleton, Manchester, 6.—Particulars of a moulded shade for blacking out light and details of the "Arplyte" portable emergency lamp.

Varley Dry Accumulators, Ltd., By-Pass Road, Barking.—A leaflet describing a new dry rechargeable accumulator.

General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2.—A 68-page valve guide.

Benjamin Electric, Ltd., Brantwood Works, Tariff Road, Tottenham, London, N.17.—A brochure dealing with a new "Anolier" system of indirect lighting.

A. C. Gilbert & Co., 109, Kingsway, London, W.C.2.—Folders relating to household electrical appliances and fans.

Londex, Ltd., 207, Anerley Road, London, S.E.20.—Leaflet No. 83 which gives a summary of the company's products—particularly relays and remote control gear.

W. Edwards & Co., Allendale Works, Southwell Road, Loughborough Junction, London, S.E.5.—A list of catalogues dealing with the Kipp and Zonen research instruments.

Hotpoint Electric Appliance Co., Ltd., 24, Newman Street, London, W.1.—A 48-page coloured catalogue of electric fires.

H.M.V. Household Appliances, 98-108, Clerkenwell Road, London, E.C.1.—Proofs of advertisement lay-outs for H.M.V. receivers.

Bonar, Long & Co., Ltd., Princes Street Works, Dundee.—A leaflet dealing with AC arc welding plant.

Brittain's Electric Motor Co., Eastdown Works, Dermody Road, London, S.E.13.—A pocket price list of single and polyphase motors.

Morphy-Richards, Ltd., St. Mary Cray.—Details of the electric iron stand now available in chromium or nickel plate finish.

British Insulated Cables, Ltd., Prescot.—A 40-page catalogue of radio materials and a catalogue of paper dielectric and electrolytic condensers for radio, &c.

British Thermostat Co., Ltd., Windmill Road, Sunbury-on-Thames.—A leaflet on dew-point control.

G. Bray & Co., Ltd., Leicester Place, Blackman Lane, Leeds, 2.—A 32-page illustrated catalogue of "Chromalox" and "Tubalox" heating elements.

Siemens-Schuckert (Great Britain), Ltd., Great West Road, Brentford.—A pocket list of DC and AC general-purpose motors with starting and control gear, and leaflets relating to three-phase and single-phase motors.

C. F. Anderson & Son, Ltd., Harris Wharf, Graham Street, London, N.1.—Details of wallboards for A.R.P.

Information Department

GENERAL inquiries from readers relating to sources of electrical goods, makers' addresses, &c., are replied to by our Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

Our extensive records enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the following :—

HEARSON drying oven.

ELECTRICITY SUPPLY

Lighting Improvements at St. Pancras, Margate and Salisbury. Remarkable Electrical Progress in Southern Rhodesia. Large American Water-power Scheme

Blackburn.—BETTER LIGHTING.—The Corporation is to improve the lighting along the arterial road and the Boulevard.

POWER POINTS.—Power plugs are to be installed in about 1,833 Council houses.

Braemar (Aberdeenshire).—ELECTRIC LIGHTING SCHEME.—The Deeside Council has approved a proposal to install electric lighting in the village of Braemar at an estimated cost of £780. Part of the cable will be underground but for the most part the overhead system has been adopted. The scheme has been remitted to the Finance Committee with power to carry it out.

Chester.—RIVER ILLUMINATIONS.—The autumn display of river illuminations has been arranged to commence to-morrow (Saturday) and continue until October 8th. As its title indicates, this year's display is concentrated on the River Dee. Besides special effects on the river, more than 30 houses and gardens on the banks will be illuminated.

Clyde Valley.—HIGH-VOLTAGE CABLES.—At a recent meeting of the Milngavie Town Council it was reported that the Clyde Valley Electrical Power Co. had served a notice of its intention to carry out extensive high-voltage cable-laying works. It was proposed to lay 11-kV cables from the Yoker power station through parts of the counties of Dumbarton and Lanark, the burgh of Milngavie, and the recent extension of the city of Glasgow to the north of Maryhill.

The Sea Front at Margate illuminated by 300-W "Mazda" lamps in B.T.H. "Ranger" Lanterns

Dartford.—EXTENSION.—The Electricity Committee is to extend mains to the Dene and Heath Farm estates at a cost of £595.

Docking.—OFFER REFUSED.—An offer by the East Anglian Electric Supply Co. to wire a number of houses in course of erection was refused by the Council last week, although the chairman urged that the installation of electricity should be seriously considered; the only drawback at the Council's Snettisham estate, he said, was the lack of electricity.

Eye (Suffolk).—ELECTRIC LIGHTING.—As the Corporation gas works broke down recently the Council has decided to sell the gasworks and use electricity.

Halesowen.—NEW SUB-STATION.—The S.W.S. Electric Power Co., Ltd., proposes to erect a sub-station in Carters Lane.

Lancaster.—SUB-STATION CONSTRUCTION.—The Corporation proposes to erect two sub-stations at Leck, Lunesdale.

Litherland.—SODIUM LIGHTING.—The Urban District Council has decided to have sodium lighting installed in Church Road at an estimated cost of £1,500.

London.—NEW DISCHARGE LIGHTING INSTALLATION.—The accompanying photograph shows a section of the recently erected mercury electric-discharge lighting installation in Prince of Wales Road, St. Pancras. Sieray 400-W type "H" lamps are housed in "Barnet-Sieray" lanterns mounted on existing trolley-bus standards. Although the roadway is very wide the distribution of light on the road surface is extremely good and the fronts of adjacent buildings are also well illuminated. This installation, which was carried out by the St. Pancras Borough Council Electricity Department, follows the extensive adoption of "Sieray" lamps in "Regent-Sieray" lanterns in other parts of the borough. The lanterns, lamps and control gear were supplied by Siemens Electric Lamps & Supplies, Ltd.

"Sieray" Lighting in Prince of Wales Road, N.W.

Louth.—RURAL SUPPLIES.—Feeling that the provision of electricity supply in its area was not proceeding fast enough the Rural District Council last week decided to write to the Grimsby Electricity Department asking that the work should be expedited. After a number of councillors had criticised the rate at which supplies were being made available the clerk pointed out that as compared with other rural districts they had not fared badly and the work had been done better than in some of the other areas. Forty-five to fifty per cent. of the district was connected to the supply and they had obtained satisfactory terms. The Rev. W. G. Calvert Lee said there were parishes where only a small proportion of people would agree to take the supply. Then others would come along and have it installed when they saw how it worked. Country people were by nature conservative and hesitated before taking on anything new. The chairman agreed that the difficulty often was that the people would not give any guarantee.

Margate.—STREET LIGHTING MODERNISATION.—In 1936 the Public Lighting Committee decided to adopt "Mercra" electric-discharge lighting for part of the Canterbury Road, and so successful was the lighting on this short stretch that before long further schemes were under consideration, both for new roads and for conversion from the existing gas lighting. Several installations were tried with different types of fittings, and it was finally decided to standardise the B.T.H. "Diron" lantern for the high-wattage "Mercra" lighting, with the "Ranger" lantern for main roads where tungsten filament lighting was necessary, and the "County Junior" lantern for the less important thoroughfares. Following on the first smaller sized installations electric lighting has now been carried through the main shopping thoroughfares and along the sea front and promenades, and with the recent completion of the last section in the Parade and Marine Terrace there is now, with the exception of a small bridge shortly to be widened, continuous electric lighting along the sea front and Canterbury Road as far as the old Westgate boundary, a length of 3.3 miles. In addition, it is proposed to carry the lighting along the Canterbury Road to Birchington Square as soon as the road widening has been completed, making a further length of 2¼ miles. This latter stretch is to have "Mercra" lighting to match that at present in service at each end. The progressive nature of the relighting programme in Margate can perhaps best be judged from the fact that in 1936 there were only thirty-two electric lighting points in the borough, while less than three years later this number has grown to a total of over 550, distributed over some eleven miles of roadway. The installation has been carried out in accordance with the requirements of the Corporation lighting superintendent, Mr. H. V. Emptage. The equipment has been supplied by the British Thomson-Houston Co., Ltd., and is being maintained under contract to the Margate Corporation by the Isle of Thanet Electric Supply Co., Ltd., the scheme being supervised by the company's engineer and manager, Mr. J. A. Forde. Mr. C. H. Fagg, mains and lighting engineer, was responsible for the erection of the lamps.

Middleton.—SUPPLY TO FARMS.—The Corporation proposes to extend the mains to farms at Thornefields, Tandle Hill, Cooper Fold and Chadderton Gate.

Northants.—STORM DAMAGE.—The electricity supply in parts of Northants was interrupted by lightning damage during a particularly violent storm which swept over the north-eastern part of the county early on Saturday morning. All three grid lines linked to the Kettering system were out of action at various times, but prompt repair work prevented the town supply being interrupted. Clipston, Sibbertoft and Marston Trussell, in the Kettering supply area, were without electricity for over an hour through damage to overhead lines, and overhead low-voltage lines at Isham were affected. At Irthlingborough poles carrying overhead cables were struck and insulators smashed. At Rushden a large part of the town was without electricity for a short period.

Rowley Regis.—NEW TRANSFORMER HOUSE.—The Midland Electric Corporation for Power Distribution, Ltd., is to erect a transformer house in Blackberry Lane, Springfield.

Salisbury.—INAUGURATION OF NEW LIGHTING.—In last week's issue details were given of the new sodium street lighting installation at Salisbury. The system was officially inaugurated on Friday, August 26th, by the Mayor, Councillor W. C. Bridge. Mr. C. J. Woodrow, chairman of the Salisbury Electric Light & Supply Co., Ltd., said that one of the most interesting features of the installation, particularly at the present time, was the system of remote control. Alderman F. H. Wort, chairman of the General Purposes Committee, in thanking the Mayor and chairman of the company, mentioned that he spoke as a director of the gas company. Under standing orders shareholders in both companies took no part in the discussions, but he was sure no member of the Council would have sold his soul for the few shares he held. Referring to the criticisms of the type of standard employed he said that these did not come from the citizens of Salisbury. In the accompanying illustrations that on the left shows the lighting effect on the wide roadway at Blue Boar Row, in the centre of the city. The Philips sodium lamps are housed in Holophane lanterns with standards by the Stanton Ironworks Co. Cradle brackets are used along the centre of the roadway, supplemented by the usual side post lighting. The road is part of the A30 route from London to Exeter. The right-hand photograph is a daylight view of the "S" bend in Southampton Road showing the well-planned siting of the standards.

Two views of the new street lighting installation at Salisbury (see note)

Stokesley.—SUPPLY EXTENSIONS.—The North-Eastern Electric Supply Co., Ltd., is to submit to the Rural District Council proposals for supplying electricity to Crathorne. Details are being settled regarding the proposed supply to Rudby.

Overseas

Argentina.—POWER PRODUCTION.—According to *Revista Electrotecnica*, the official organ of the Argentine Association of Electrical Engineers and the Comité Electrotecnico Argentine, there were, at the end of 1938, 928 power stations in Argentina, with a total installed capacity of 1,117,000 kW (883,000 kW steam, 193,000 kW internal combustion engines and 41,000 kW hydro-electric). The aggregate output during the twelve months is given as 2,214.8 million kWh and the consumption at 1,843.9 million kWh, increases of respectively 6 and 6.2 per cent. as compared with 1937.

Eire.—ELECTRICITY BOARD TO ACQUIRE SKERRIES UNDERTAKING.—The electricity undertaking at Skerries is to be taken over by the Electricity Supply Board this month.

Northern Ireland.—ELECTRICITY AT THE CAUSEWAY.—According to the latest electricity report of the Northern Ireland Ministry of Commerce the Giant's Causeway district is now linked with the main distribution system of the company supplying electricity in the area. The provision of an electricity supply in this district illustrates the energy with which Northern Ireland is tackling the problem of rural electrification. A considerable part of the country is sparsely populated and does not lend itself readily to electrification.

EMERGENCY MEASURES AT LONDONDERRY.—The municipal electrical engineer recently reported that in the event of an emergency the Londonderry power station would be run at the maximum overload rating. This entailed the installation of four large transformers and the provision of new switchgear, for which the Electricity Board would be responsible. The work would also be advantageous for normal development.

Southern Rhodesia.—ELECTRICITY SALES TREBLED IN A YEAR.—The sales of electricity in Southern Rhodesia have trebled in one year according to the report of the Electricity Supply Commission for the year ended March 31st, 1939, the third year of the Commission's existence. The number of kWh sold increased from 10½ million kWh to 30 million kWh and is now approaching 50 million kWh per annum. Among the five municipal consumers, Bulawayo purchased 6½ million kWh and Salisbury 2¾ million kWh. As many of the Southern Rhodesian mines now take electricity from the Commission, destruction of the timber resources of the Colony is being checked. Since the Commission started operations just over three years ago, it has spent over £900,000 on capital account, of which £470,000 was for transmission lines, on which a further £84,000 will be spent. Approximately 50,000 tons of coal from the Wankie mine in the Colony was used, and by the end of the present year some 80,000 tons per annum will be needed. By the interconnection of three power stations at Gatooma, Que-que and Gwelo, the first link of a grid system in the Colony has been formed. The average price per kWh sold is now just over 0.9d.

United States.—LARGE HYDRO-ELECTRIC SCHEME.—At a point known as Rip Raps in the Skagit Canyon, six miles upstream from Diablo Dam, a power plant is to be constructed which will ultimately have a capacity of 480,000 HP. The Ruby Dam, as it is to be called, will be second only in height to the Boulder Dam on the Colorado River. It will be 651 ft. high with the crest at 1,728 ft. above sea level. It will be only 60 ft. wide across the canyon at the base and 1,600 ft. along the roadway across the top.

TRACTION

Northern Ireland.—BELFAST TROLLEY-BUS DEPOT.—The City Corporation Transport Department proposes to erect a new trolley-bus depot which, in its two storeys, will provide adequate accommodation for a large trolley-bus fleet, service and repair shops and an open-air parking place on the roof.

At a meeting of the Belfast Electricity Committee last week it was decided to recommend the Corporation to apply for a loan of £55,385 for new sub-stations for trolley-bus routes on the east side of the city. The stations will be on Newtownards Road, Bridge End, Belmont Road, Knock, Dundonald, Bloomfield, Castlereagh Road, Cregagh Road and Ormeau Road.

South Africa.—TROLLEY-BUSES IN PRETORIA.—Last week Councillor Hopf, chairman of the Pretoria Trading Committee, inaugurated the new trolley-bus services which are replacing the tramcars. Twenty-four single-deck and ten double-deck trolley-buses are in course of delivery from the makers in Great Britain, and it is anticipated that the full service will be operating early in 1940.

Switzerland.—A POSTAL UNDERGROUND RAILWAY.—In a recent issue of the *Schweizerische Bauzeitung* some particulars are given of the underground electric railway which has been at work since the end of 1938 transporting the mails between the Sihl (Zürich) post office and the railway station in Zürich. The tunnel is rectangular in section, measuring 8 ft. 9 in. in width (not including a small inspection channel) and about 4 ft. 3 in. in height. The line, which has a gauge of 23½ in., is about 372 yd. long. On it runs an automatically controlled 3½ HP electric truck carrying a load of 5 cwt. at a speed of 10 MPH. Lifts are provided at each end of the tunnel to bring the electric truck to ground level.

Municipal Supply Undertakings' Results

We regret that in the table of municipal supply undertakings' results (August 18th issue) the name of the borough electrical engineer of Barnstaple was given incorrectly. The position is held by Mr. R. Robinson.

FINANCIAL SECTION

New Companies. Returns of Capital. Debenture Charges. Bankruptcies and Liquidations. Reports of Electrical Companies. Dividend Announcements. Stocks and Shares

New Companies Registered

Bertram Thomas (Engineers), Ltd.—Private company. Registered August 23. Nominal capital £125,000 in 125,000 shares of £1 each. Objects: To acquire the business of electrical and mechanical engineers and contractors now carried on by B. Thomas, E. Thomas and F. C. Thomas, at Worsley Street, Hulme, Manchester, as Bertram Thomas. The permanent directors are: B. Thomas, Beech Trees, Durham Massey, Ches., E. Thomas, Lime Grove House, Marsland Road, Brooklands, Ches, and F. C. Thomas, 12, Cromwell Road, Longford Park, Stretford, Lancs. Solicitors: Simpson, Wright & Haworth, Manchester.

Artistic Electricals, Ltd.—Private company. Registered August 21st. Capital, £2,500. Objects: To carry on business as electrical and gas equipment specialists, manufacturers of and dealers in electrical and gas fittings, &c. The subscribers are: B. Holden, 3, Clyda Mansions, Gondar Gardens, N.W.6, and W. L. Upsdell, 7E, Chapter Street, S.W.1. Solicitors: Benjamin & Co., 68-70, Fenchurch Street, E.C.3.

Pelham Industries, Ltd.—Private company. Registered August 19th. Capital, £100. Objects: To carry on the business of manufacturers and repairers of and dealers in dynamos, motors, armatures, ignition coils, magnetos, radio, telephones, television, etc. The directors are: R. D. Wicks, 11, Tavistock Road, Paddington, W.11, and A. B. Eiloart, 55, Champion Hill, S.E.5. Secretary: R. D. Wicks. Registered office: 6, Pelham Mews, Portobello Road, W.11.

Dome Electric Co., Ltd.—Private company. Registered August 17th. Capital, £3,000. Objects: To acquire the business of an electrical contractor carried on by Robert Foden-Petchler at 150, Stretford Road, Manchester, as "The Dome Electric Co." The permanent directors are: R. Foden-Petchler, 32, Northleigh Road, Old Trafford, Manchester, and J. H. Wilson, 25, Delamere Road, Gatley, Ches. Registered office: 150, Stretford Road, Manchester. 15.

F. N. Johnstone, Ltd.—Private company. Registered August 21st. Capital, £400. Objects: To carry on the business of electrical, mechanical and general engineers, manufacturers of and contractors for and dealers in all apparatus and accessories for use in connection with the generation, distribution, supply and accumulation of electrical energy, &c. The directors are: F. N. Hope Johnstone, and Mrs. M. N. Hope Johnstone, both of 6a, Torwood Gardens, Torquay.

Holbrook & Chandler, Ltd.—Private company. Registered August 22nd. Capital, £5,000. Objects: To carry on the business of manufacturers of and repairers of and dealers in wireless and television sets, accessories and apparatus. The permanent directors are: B. Holbrook, 1, St. John's Road, Ryde, I.W., and two others.

Featherstone Radio Relay Service, Ltd.—Private company. Registered August 23rd. Capital, £300. To construct, erect, establish and maintain wireless signal stations, and to receive, transmit, relay, and distribute radio or television signals or programmes, &c. The permanent directors are: R. H. Jackson, radio engineer, and Mrs. S. E. Jackson, both of Station Lane, Featherstone, Yorks.

Niagara Signs, Ltd.—Private company. Registered August 5th. Capital, £120. Objects: To carry on the business of manufacturers of and dealers in electric signs, advertising apparatus of every description, electric-discharge tubes, &c. Directors: M. H. J. Bebb, 63, Midhurst Road, Kings Norton, Birmingham, G. J. Hughes, 255, Streetsbrook Road, Solihull, and T. M. Lewis, 224, Streetsbrook Road, Solihull. Solicitor: G. E. Davies, LL.B., 124, Edmund Street, Birmingham.

Nuray Signs, Ltd.—Private company. Registered August 19th. Capital, £100. Objects: To carry on the business of neon sign manufacturers, illuminated sign manufacturers, lighting specialists, manufacturers of and dealers in electrical, gas and oil lamps, &c. Directors: M. V. Dampier-Bennett (permanent managing director), 1, Repton Avenue, Sudbury, Middlesex, O. B. Dick, 32, Sheffield Terrace, W.8, and W. B. Dick, 27, Radnor Place, W.1. Registered office: 24, Holborn, E.C.1.

Furzehill Laboratories, Ltd.—Private company. Registered August 19th. Capital, £100. Objects: To carry on the business of electricians, mechanical engineers, manufacturers of and dealers in electricity, violet ray and X-ray tubes and apparatus, &c. Directors: J. H. Reyner (permanent) and Mrs. B. M. Reyner, both of The Cottage, Boreham Wood, Herts. Solicitors: Turner & Evans, 6, Shenley Road, Boreham Wood, Herts.

Truvision Rentals, Ltd.—Private company. Registered August 24th. Capital, £100. Objects: To carry on the business of manufacturers of and dealers in television, wireless and electrical apparatus; to let out on hire or rental television and other apparatus, &c. C. C. L. Randall, 50, Cannon Street, E.C.4, is first director. Registered office: 50, Cannon Street, E.C.4.

Pittville Radio, Ltd.—Private company. Registered August 24th. Capital, £400. Objects: To acquire the business of an electrical engineer and radio dealer, now carried on by C. W. Smith at Pittville Gates, Cheltenham, as the Pittville Radio. Subscribers: C. R. Piggins, Pembroke House, Pembroke Croft, Hall Green, Birmingham, and C. W. Smith, 5, Prestbury Road, Cheltenham. Registered office: 100, Summer Hill Road, Birmingham.

Southern Electric Equipment Co. (Hove), Ltd.—Private company. Registered August 24th. Capital, £1,000. Objects: To carry on the business of manufacturers and repairers of and dealers in electric lamps, bells, fires, stoves, cookers, insulators and insulating materials, sound reproduction machines and wireless aerials, cabinets, &c. Permanent directors: G. Swire de Moleyns Rogers (chairman), Povington Manor, Plumpton, and D. A. W. Ward, 200, Nevill Road, Hove, 4. Secretary: J. C. Walker. Registered office: 103, Church Road, Hove, 5.

Your Murphy Dealers, Ltd.—Private company. Registered on August 24th. Nominal capital, £100. Objects: To carry on the business of dealers in and repairers and manufacturers of radio and television receiving, transmitting and communicating instruments and apparatus, &c. Subscribers: F. J. Osborn, 16, Guessens Road, Welwyn Garden City, Herts; and C. R. Casson, 19, Uphill Road, Mill Hill, N.W.7. Solicitors: Clifford-Turner & Co., 11, Old Jewry, E.C.2.

Intensive Vibrations, Ltd.—Private company. Registered August 24th. Capital, £1,000. Objects: To carry on the business of electrical, mechanical, motor and manufacturing engineers, machinists, fitters, makers of electrical instruments, and accessories, chemists, galvanisers, manufacturers of and dealers in electric, magnetic, galvanic and other apparatus, &c. Directors: W. G. Moore (permanent director and chairman), 48, High Mead, Harrow, Middx.; and Major Baron Robeck, R.A., Gowran Grange, Naas, Co. Kildare. Registered office: 48, High Mead, Harrow, Middx.

Electrical & Engineering Distributors (Cardiff), Ltd.—Private company. Registered August 25th. Capital, £1,000. Objects: To carry on the business of manufacturers of, agents for and dealers in electric, gas and oil lamps, quartz lamps, reflectors, bells, washing machines, vacuum cleaners, wireless and television sets, &c. H. E. B. Lewis, "Yeowood," Cyncoed Avenue, Cardiff, is the first director. Solicitor: R. W. Nicholas, Royal Chambers, Park Place, Cardiff.

Electrical Plant & Repair Co., Ltd.—Private company. Registered August 25th. Capital, £2,000. Objects: To carry on the business of manufacturers and repairers of and dealers in dynamos, motors, armatures, magnetos, &c. Directors: S. J. Garrod, 69, Bateman Road, Chingford, E.4; A. F. Marino, 47, Rosebery Square, Rosebery Avenue, E.C.1; and D. J. Donovan, 103, Axholme Avenue, Edgware, Middlesex. Registered office: Bristol House, 19-20, Holborn Viaduct, E.C.1.

W. F. Wilkinson, Ltd.—Private company. Registered August 25th. Capital, £1,650. Objects: To carry on the business of manufacturers and repairers of and dealers in magnetos, dynamos, armatures, motors, radiators, batteries, lamps, motor accessories and component parts, &c. Directors: Wm. F. Wilkinson, 16a, Cleveland Street, Doncaster, and J. W. Wilkinson, 5, Bond Road, Barnsley.

Eaton Electrical Co. (Woolwich), Ltd.—Private company. Registered August 26th. Capital, £750. Objects: To carry on the business of repairers of and dealers in electrical accumulators, batteries, acids and containers, dynamos, motors, transformers, magnetos and electrical plant, lamps and accessories, &c. Directors: H. Eaton, 13, New Road, Abbey Wood, S.E.2; S. E. Eaton and Mrs. A. M. Eaton, both of 174, Myrtle Road, Heeley, Sheffield. Secretary: G. Matthews. Registered office: 4, Westfield Street, Woolwich, S.E.18.

Darwin Radio, Ltd.—Private company. Registered August 26th. Capital, £1,000. Objects: To carry on the business of manufacturers of, agents for and dealers in wireless and television sets, &c. Directors: A. Jonas and Mrs. B. Jonas, both of 46, Western Avenue, N.W.11.

Smallwood Electrical, Ltd.—Private company Registered August 26th. Capital, £1,000. Objects: To acquire the business of a manufacturer and supplier of luminous tubes, signs and starter batteries, electrical engineer and hardware dealer carried on by B. J. Smallwood as the Neon Sign Co. and B. J. Smallwood at 72, Warwick Avenue, Edgware, and 72, Greyhound Hill, Hendon, N.W.4. Permanent directors: B. J. Smallwood, 72, Warwick Avenue, Edgware, and A. Dossmar, 132, Sutherland Avenue, Maida Vale, W.9. Registered office: 72, Greyhound Hill, Hendon, N.W.4.

Insulation Equipments, Ltd.—Private company. Registered August 26th. Capital, £2,000. Objects: To carry on the business of manufacturers and factors of and dealers in insulation materials, wireless equipment and electrical apparatus, electrical engineers, &c. Directors: A. G. Snell, Georgian House, Monmouth Drive, Sutton Coldfield, and E. C. Rooker, 14, Darnick Road, Sutton Coldfield. Registered office: 456, Chester Road North, Sutton Coldfield.

New Departure Co., Ltd.—Private company. Registered August 25th. Capital, £100. Objects: To carry on business as manufacturers of and dealers in dynamos, motors, armatures, magnetos, batteries, &c. Subscribers: J. M. Hawkins and W. A. Quaye, both of Bush House, Aldwych, W.C.2. Solicitors: Crane & Hawkins, Bush House, Aldwych, W.C.2.

Companies' Returns

Statements of Capital

British Short-Circuit Testing Station, Ltd.—Capital, £10,000 in £1 shares. Return dated April 19th, 1939. 302 shares taken up. £302 paid. Mortgages and charges nil.

Colombo Electric Tramways & Lighting Co., Ltd.—Capital, £150,000 in £10 shares. Return dated May 30th, 1939. 13,084 shares taken up. £840 paid on 84 shares, £130,000 considered as paid on 13,000 shares. Mortgages and charges nil.

Ceag, Ltd.—Capital, £1,000 in £1 shares. Return dated June 16th, 1939. All shares taken up. £1,000 paid. Mortgages and charges nil.

Chloride Electrical Storage Co., Ltd.—Capital, £1,250,000 in £62,000 preference stock, £791,100 "A" ordinary stock, £297,603 "B" ordinary stock and £99,297 unissued. Return dated June 23rd, 1939. All preference "A" ordinary and "B" ordinary stock taken up. £207,200 paid on £48,750 preference, £92,913 "A" ordinary and £65,537 "B" ordinary stock, £943,503 considered as paid on the remainder. Mortgages and charges nil.

Aberayron & District Electricity Supply & Power Co., Ltd.—Capital, £12,500 in £1 shares. Return dated June 26th, 1939. 10,000 shares taken up. £7,002 paid, £2998 considered as paid. Mortgages and charges nil.

J. Stone & Co., Ltd.—Capital, £1,200,400 in 600,000 preference and 600,400 ordinary shares of £1. Return dated June 27th. All shares taken up. £1,200,400 considered as paid. Mortgages and charges, nil.

Associated Manufacturers of Electric Traction Equipment, Ltd. — Capital, £10,000 in £1 shares. Return dated June 29th. All shares taken up. £2,500 (5s. per share) paid. Mortgages and charges, nil.

B.E.T. Electricity Supply Co., Ltd.—Capital, £750,000 in £1 shares. Return dated June 29th. 749,000 shares taken up. £440,388 paid. £308,612 considered as paid. Mortgages and charges, £352,263 0s. 3d.

Mortgages and Charges

Peto Scott Electrical Instruments (Holdings), Ltd.—Issues from July 21st, to August 4th, 1939, of £3,500 debentures, parts of a series already registered.

Milliwatt Heating Pad, Ltd.—Particulars filed of £775 debentures, authorised July 13th, 1939, charged on the company's undertaking and property, present and future, including uncalled capital, the whole amount being now issued.

Trevelyans (Birmingham), Ltd.—Satisfaction in full on June 6th, 1939, of mortgage dated December 12th, 1922, and registered May 12th, 1939. (Notice filed August 15th, 1939.)

Truvox Engineering Co., Ltd.—Debenture, charged on the company's undertaking and property, present and future, including uncalled capital, dated August 11, 1939, to secure £4,000. Holders: Control Nominees, Ltd.

Increases of Capital

Aren (Radio & Television), Ltd.—The nominal capital has been increased by the addition of £4,900, beyond the registered capital of £100. The additional capital is divided into 8,000 ordinary shares of 1s. and 4,500 preference shares of £1. The original capital has been subdivided into 2,000 ordinary shares of 1s.

J. S. Ramsbottom & Co., Ltd.—The nominal capital has been increased by the addition of £9,000, in £1 ordinary shares, beyond the registered capital of £1,000.

Hotric, Ltd.—The nominal capital has been increased by the addition of £10,000, in £1 shares, beyond the registered capital of £10,000.

Goodley Electric Jacquard Co., Ltd.—The nominal capital has been increased by the addition of £1,900, in £1 ordinary shares, beyond the registered capital of £100. According to the articles of association, H. J. Baldwin & Co., Ltd., may, so long as they hold any shares, appoint two directors.

Gordon Elf, Ltd.—The nominal capital has been increased by the addition of £3,000, in £1 ordinary shares, beyond the registered capital of £6,000.

E. & E. Kaye, Ltd.—The nominal capital has been increased by the addition of £20,000, in £1 ordinary shares, beyond the registered capital of £80,000.

Receivers Released

W. J. Marchant (Electrical Engineers), Ltd.—Frank B. Durrant, 47, High Street, Tonbridge, ceased to act as receiver and manager on August 15th, 1939.

F. W. Bland & Co., Ltd.—Robert Gibbons, of 37, Senhouse Street, Maryport, ceased to act as receiver and/or manager on May 19th, 1939. (Notice filed August 19th, 1939.)

Company Liquidations

McEwan & Co. (Brighton), Ltd.—Winding up voluntarily. Liquidator, Mr. N. W. Osborne, 11-12, Finsbury Square, E.C.2.

Dulci Electrical Co., Ltd.—Particulars of claims by September 22nd to the liquidator, Mr. L. R. Binns, 2, South Place, London, E.C.2.

Bankruptcy Proceedings

F. Murray, trading as the Wellington Radio, lately carrying on business at 13, Wellington Parade, Blackfen Road, Sidcup, Kent, radio dealer.—The receiving order herein was made on a creditor's petition recently, and the debtor has now lodged a statement of affairs showing gross liabilities of £1,801, of which £943 is expected to rank for dividend. The assets are estimated to realise £67, leaving a deficiency of £876. The failure is ascribed to the gross profits being insufficient to meet debtor's overhead charges as a result of bad debts, decline of trade in consequence of the crisis of September, 1938, liability as guarantor of hire-purchase agreements and to loss on forced sale of stock and effects. At the first meeting of creditors held recently the case was left in the hands of the Official Receiver.

K. H. Mullinger, electrician, 10, Pitman Avenue, Trowbridge, formerly carrying on business at the Radio Exchange Stores, King Street, Melksham.—Receiving order made August 16th on debtor's own petition. First meeting September 6th at 26, Baldwin Street, Bristol. Public examination, October 11th, at the County Court Offices, Bath.

A. Elliott, electrical engineer, 14a, Hargreaves Street, and 148, Trafalgar Street, Burnley, also trading as Vacs Domestic Appliances at the Empress Hall, Butterworth Street, Littleborough.—Last day for receiving proofs for dividend September 9th. Trustee, Mr. H. S. Haworth, 7, Lord Street West, Blackburn, Official Receiver.

J. T. Eaton (X.L. Service Station), wireless dealer, 13, Bolton Road, Bury, Lancs.—Discharge suspended for two months until September 19th.

E. L. Pratt, electrical engineer, 5, Nowell Mount, Harehills, Leeds.—Order dated March 29th, granting discharge subject to bankrupt consenting to judgment for £100.

G. F. Germaney, radio dealer, 26, Carringham Road, Stanford-de-Hope.—Discharge suspended for two months until September 27th.

Reports and Dividends

The Hendon Electric Supply Co., Ltd., is maintaining its interim dividend at 2½ per cent.

The North Eastern Electric Supply Co., Ltd., has declared an interim dividend of 2½ per cent. (same).

Edmundsons Electricity Corporation, Ltd., reports that the results of the operations of its group of companies during July, as compared with the corresponding month of 1938, show an increase of 22 per cent. in kWh sold.

Ransomes & Rapier, Ltd., are paying an interim ordinary dividend of 2½ per cent., tax free (unchanged).

The Ransome & Marles Bearing Co., Ltd., has announced a final dividend of 11 per cent., less tax, making 20 per cent. for the year (same).

Dutch East Indian Imports

Market in the Outer Possessions

IN the ELECTRICAL REVIEW of June 16th details were given of the electrical imports of Java and Madura. In addition to these developing Dutch East Indian colonies there are Sumatra, Borneo, the Celebes and other islands known together as the Outer Possessions, where a promising electrical trade is done.

The principal items last year, with the chief supplying countries, are shown in the accompanying table, which has been extracted from the official returns of the Netherlands Colonial Government, increases or decreases on 1937 being added. (£1 = about 8¾ fl.).

It will be seen that Holland dominates the trade and that among other competitors the United Kingdom makes a poor show. On the question whether she might do better opinions differ. While there are market allocation agreements which prevent certain concerns from competing, there have been reports recently which suggest scope for greater activity.

For example, not long ago the management of the Bandoeng Fair stated that Netherlands industries were only partly interested in supplying the needs of the large population of the islands, and that constructional and development work of various kinds, *e.g.*, railway electrification, was bringing demands for machines, tools and technical equipment with which existing market organisations could not deal.

Again, a representative of a number of Australian exporting concerns reported after a recent journey in the Dutch East Indies that he had received over 400 trade inquiries for goods, including ammeters, dynamos, and electric refrigerators.

	1938 Fl. (000)	Inc. or dec. on 1937 Fl. (000)
Dynamos, motors, transformers, etc.—		
Total	784	+ 55
From Holland	498	− 78
„ Germany	123	+ 15
„ Sweden	7	− 16
„ Switzerland	104	+ 93
„ United States	24	+ 14
„ Great Britain	8	− 2
Radio apparatus and parts—		
Total	219	+ 64
From Holland	170	+ 38
„ Great Britain	13	+ 12
„ Germany	2	+ 1
„ United States	26	+ 18
Radio valves—		
Total	86	+ 5
From Holland	83	+ 5
„ United States	—	− 2
Electric bulbs for cycles and torches—		
Total	118	+ 23
From China	88	+ 7
„ Japan	6	+ 2
Electric bulbs for motor-cars—		
Total	11	+ 5
From Holland	7	+ 3
Electric bulbs, other types—		
Total	287	+ 28
From Holland	226	+ 8
„ Germany	29	+ 1
Electric pocket and cycle lamps, with batteries—		
Total	143	− 140
From Hong Kong	41	− 49
„ China	19	+ 11
Electric cable—		
Total	277	− 311
From Holland	91	− 193
„ Germany	93	− 100
From Italy	15	+
„ Great Britain	20	− 13
Electrical installation material for buildings, unspecified—		
Total	179	− 82
From Holland	69	− 89
„ Germany	82	+ 8
„ Japan	1	+
Batteries for torches—		
Total	131	− 32
From China	51	− 5
„ Japan	9	—
„ Hong Kong	19	− 23
Accumulators—		
Total	62	− 15
From Great Britain	3	+ 1
„ United States	33	− 7
„ Germany	6	+ 5
„ Japan	8	− 10

STOCKS AND SHARES

TUESDAY EVENING.

STOCK Exchange markets, like every part of the community, have been on the tip-toe of tension waiting from hour to hour, rather than day to day, for fresh developments in the international situation. Business has by no means come to a full-stop, though the air remains full of conjectures as to what would be the immediate result of a declaration of war. In the latter event, the House would probably be closed for some few days. Its reopening, in London or elsewhere, would enable the settlement of outstanding bargains and, at the same time, provide opportunities for buying or selling on a limited scale.

The fixation of minimum prices, referred to elsewhere, has an indirect effect upon other markets, in that if a man wishing to raise money finds he cannot sell War Loan or Consols, he turns to something which is still realisable. In such cases as those where good industrials are amongst his investments he might have to accept some lower price than he would if all the markets were free. On the Tuesday afternoon of this present week a wave of optimism, as Stock Exchange members called it, spread throughout the House, raising prices and hopes of a peaceful settlement.

Minimum Prices for Gilt-edged Stocks

Last Thursday morning, August 24th, the second day after the Soviet-German pact surprise, business in the gilt-edged market was suspended while the Stock Exchange Committee drew up a list of minimum prices. Quotations ruling at the close of business on the previous day, August 23rd, were taken as the basis below which no member was allowed to do a bargain, or to negotiate a purchase or sale. The principle was last adopted, it will be remembered, at the time of the Munich trouble, although on that occasion arrangements were made by the dealers with the Stock Exchange Committee's approval, whereas this time the decision is the Committee's. The measure is taken, of course, by way of a precaution against the possible effects of nervous selling which might, in the manner of a snowball, gather wholesale proportions. By ruling out the risk of any such fall in prices as might suggest panic or demonstration, the authorities concerned have, it goes without saying, a good deal of support, although the principle is not one that commands unanimous approval.

As a general indication of the level fixed for gilt-edged prices, it is to be noted that the minimum for dealings in War Loan has been put at 88½, which is 4½ points below the "Munich" figure and, incidentally, a point above the quotation which would put the stock on a 4 per cent. yield basis. In addition to Government stocks, many trustee securities of various kinds, and certain others such as the Central Electricity Board issues, come under the rule. The last-mentioned stocks are mostly put about 2½ points lower than the prices of a week ago, while the London Transport issues are marked down by about 1½ per cent.

Chief Developments

Up to date, among the chief measures affecting the Stock Exchange have been the fixing of minimum prices for dealing in gilt-edged securities, as a result of which the chance of a demoralising collapse is obviated; the rise in bank rate to 4 per cent., or 2 per cent. higher than the rate which had ruled unchanged for seven years; the removal of the official support for sterling, with immediate implications for interests in gold, commodities and dollar holdings. The Treasury has also ordered that holders of various foreign securities must provide the Bank of England with the particulars, and must obtain official sanction before a sale of these stocks can take place. The result has been to bring to a standstill dealings in American and most other international stocks.

Bank Rate

So long had Bank Rate remained stationary that, in many City minds, custom had endowed the figure of 2 per cent. with something of permanency. Consequently the announcement by the Government broker in the House created some stir, and a canvassing of opinion as to its significance. The change was, of course, immediately recognised as being of consequence to circles far wider than the banks and the money markets, Bank Rate having the greatest influence on interest-rates as a whole, and, consequently, on the yields which the investor expects from his gilt-edged and other investments. As a general rule, one object of a rise in the rate is to increase the attraction of keeping money in the country concerned. This is supposed to be the chief aim on the present occasion, when money might feel tempted to leave these shores, but it is taken also as a hint of caution to the business world against over-commitments.

Equipment and Manufacturing

Electrical equipment shares have upheld their reputation as one of the soundest sections of the industrial markets. After the general setback of the previous week, there has been little tendency for prices to slip further. Among the market leaders, General Electrics at 73s. 6d. and English Electrics at 34s., have regained a little ground. Associated Electricals at 38s. stand firm, as do the shares in the cable manufacturing group. The dullness of Callender's at 60s. makes an exception. Crompton Parkinsons have given way from 18s. 9d. to 17s. 6d.; few of the declines have gone to serious lengths. In talking of prices it has, of course, to be noted that quotations are more or less nominal and that changes from day to day have not their normal significance.

Sellers Wanted

Practical evidence that selling is not the only thing in people's minds just now, is the list, issued by a firm of Stock Exchange dealers in the electricity supply market, bidding for various debenture and preference issues. The firm are buyers of various amounts up to £5,000 stock in the following, which is a selection from their list:—

Bournemouth & Poole Elec. 4½ p.c. Pref.	at 20/–
British Power & Light 4½ p.c. Pref.	„ 20/–
County of London 4 p.c. Pref.	„ 18/–
Edmundsons 7 p.c. Pref.	„ 28/–
Mersey Power 6 p.c. Pref.	„ 24/–
Scottish Power 6 p.c. Pref.	„ 25–
B.C. & H. Power 3½ p.c. Deb.	„ 86
B.E.T. 4½ p.c. Deb.	„ 103
London Power 3¼ p.c. Deb.	„ 83
Midland Counties 3½ p.c. Deb.	„ 90
Yorkshire Elec. 5 p.c. Deb.	„ 100

In all these cases, it seems, buyers willing to pay what look to be reasonable prices are having difficulty in finding a holder willing to part from his stock.

Industrial Markets

While there is little freedom in dealings in the industrial markets, it would be wide of the mark to say that business has come to a complete stop. Inevitably, quotations were lowered and the margin between buying and selling prices was widened: but by means of negotiation a fair number of shares are changing hands. Indeed, as noted above, the would-be buyer is heard not infrequently to complain that he cannot satisfy his wants. Selling is generally regarded as an unattractive proposition at the prices now obtainable, particularly in view of the proved ability of sound ordinary shares to stand the holder in good stead on these or similar occasions. In the fall of the pound sterling, the inflation theorists have found further grounds for advocating ordinary shares as better holdings than gilt-edged stocks, or, for that matter, than cash in the bank.

The Calm Investor

In such days of crisis, it might be taken as a matter of course that previous buyers of stocks and shares who had been unable to obtain delivery of their purchases, could make certain of getting their securities. Yet the actual experience of the past week by no means endorses this assumption. Stock Exchange jobbers who had previously sold shares in the ordinary course of business but who have been unable to get them back, still declare that sellers do not come in. It stands to reason, of course, that a certain proportion of hitherto undelivered stock has come to market, and that patient buyers have at length obtained what they had been awaiting for weeks, in some cases, for months. But in a great many instances, the anticipated seller has not put in an appearance. Holders are not selling their interests. Prices keep at levels that, on the face of them, look too high by comparison with standard stocks such as War Loan and Consols. A question constantly asked is why the prices of issues in such companies should hold their ground as they are now doing. The answer, as simple as prosaic, is that investors are too well satisfied with their holdings to be frightened by any crisis into selling.

Automatic Control System

THE system of automatic control which is named "Pigral" is primarily designed for the regulation of heating installations, but is sufficiently versatile to be equally well applicable to air conditioning and a variety of other requirements. It has been in use for some years in France, where there are 49 installations in public buildings, schools, hospitals, hotels, blocks of offices and factories, several of them being in Paris.

The manufacture of apparatus for this method of control is now being undertaken in this country by the Watford Electric and Manufacturing Co., Ltd., the principle employed being that of a balanced Wheatstone bridge circuit. For example, for heat control the detector is a simple nickel resistance (which can be made in several forms) variations of which, due to temperature changes, affect the equilibrium of the bridge. This unbalance, through the agency of a galvanometer relay, causes regulating valves or other devices to raise or lower the heating level until the bridge regains its balance.

Operation takes place in impulses, which vary with the degree of bridge unbalance, so avoiding any "hunting"; artificial balancing is not employed and patented features prevent the galvanometer relay from sticking. Sensitivity and speed of operation can be varied to suit requirements, and it is possible to "split" the detector elements in series over a large space to be heated and so obtain average temperature control. The detectors can be used in inflammable atmospheres.

Watford-Pigral gear is cubicle-built for boiler house conditions and enables several boilers to be controlled in a number of different ways.

ELECTRICAL COMPANIES' SHARES

Prices, Dividends and Yields

Company	1939 High-est	1939 Low-est	Dividend Pre-vious	Dividend Last	Price Aug. 29	Rise or Fall	Yield p.c. £	s.	d.
Home Electricity Companies									
Bournemouth and Poole	68/3	60/–	15	15	63/6xd.	—	5	0	0
British Power and Light	30/9	25/–	7	7	25/6	–2/–	5	9	10
City of London	33/9	29/6	7½	7½	29/6xd.	–6d.	5	1	8
Clyde Valley	37/9	34/–	8	8	35/9	–6d.	4	8	4
County of London	46/9	39/–	10½	10½	39/6	–½	5	18	0
Edmundson's :									
7% Pref.	31/6	30/–	7	7	30/–	—	4	13	4
Ord.	27/9	23/–	9	6	23/6	–1/6	5	2	2
Elec. Dis. Yorkshire	41/6	37/9	9	9	38/9	—	4	16	9
Elec. Fin. and Securities	47/9	45/–	12½	12½	47/6	—	5	5	3
Elec. Supply Corporation	51/9	47/6	12	12	47/–	—	5	2	1
Isle of Thanet	20/–	18/6	4	4	18/6	—	4	6	6
Lancs Light and Power	34/6	29/–	7½	7½	30/–	–⅛	5	0	0
Llanelly Elec.	22/6	20/6	5½	5½	20/6	–6d.	5	7	4
Lond. Assoc. Electric	30/–	23/9	7	7	23/9	–⅛	5	18	0
London Electric	34/3	31/–	7	7	31/3	–⅛	4	6	2
London Power Deb. Red.	106½	102	5	5	102	—	4	18	2
Metropolitan	51/–	43/6	12	12	43/9	–¼	5	10	1
Midland Counties	38/9	34/–	8	8	37/6	–⅛	4	5	4
Mid. Elec. Power	41/9	38/3	8	9	39/6	—	4	11	2
Newcastle Elec.	28/9	26/6	7	7	27/–	—	5	3	8
North Eastern Electric :									
Ordinary	32/3	28/6	7	7	29/–	–1/6	4	16	7
7% Pref.	32/6	30/–	7	7	31/–	—	4	10	4
Northampton	48/–	45/–	10	10	45/–	–⅛	4	9	0
Notting Hill 6% Pref. (£10)	13½	12½	6	6	12½	–½	4	14	1
Northmet Power :									
Ordinary	46/6	41/–	10	10	41/3	–2/–	4	17	0
6% Pref.	29/–	24/6	6	6	24/6	–2/6	4	18	0
Richmond Elec.	29/–	26/3	7	7	26/3	—	5	6	10
Scottish Power	38/9	33/9	8	8	32/6	–½	4	18	0
Southern Areas	22/9	19/–	5	5	19/–	–6d.	5	5	3
South London	30/9	26/3	7	7	26/6	—	5	5	8
West Devon	23/3	21/3	5	5	21/3	–⅛	4	14	1
West Glos.	21/3	17/3	2	2½	17/6	–1/–	2	17	2
Yorkshire Elec.	38/6	34/9	8	8	35/–	–6d.	4	11	4
Overseas Electricity Companies									
Atlas Elec.	4/3	2/–	Nil	Nil	2/–	–6d.	—		
Calcutta Elec.	39/–	29/–	10*	10*	29/–	–6d.	—		
Cawnpore Elec.	34/6	28/3	10	10	28/3	—	—		
East African Power	26/3	22/–	7	7	22/–	—	6	16	4
Jerusalem Elec.	24/6	22/–	7	7	20/–	–1/–	6	16	4
Kalgoorlie (10/–)	10/6	9/6	7½	7	10/–	–3d.	7	0	0
Madras	31/–	21/3	8*	8*	21/3	—	—		
Montreal Power	35½	31	1½	1½	34	—	—		
Palestine Elec. "A"	29/6	20/–	7½*	5*	20/–	–⅛	5	0	0
Perak Hydro-electric	18/9	13/6	7	6	13/9	–2/–	8	14	6
Shawinigan Power	23½	20	85cts.	83cts.	22	+¾	—		
Tokyo Elec. 6%	61	37	6	6	37½	—	16	0	0
Victoria Falls Power	73/9	60/–	12½	15	67/6	—	4	9	0
Whitehall Investments Pref.	19/6	15/–	7½	7½	15/–	–1/–	10	0	0
Public Boards									
Central Electricity :									
1950–70	112	103	5	5	103	–2½	4	17	1
1955–75	115½	107	5	5	107	–2½	4	13	6
1951–73	106½	101	4½	4½	101	–2½	4	9	0
1963–93	95½	84	3½	3½	84	–2½	4	3	4
London Elec. Trans. Gtd.	88½	83	2½	2½	83	–2½	2	19	6
London & Home Counties									
1955–75	107½	105	4½	4½	105½	–1	4	5	6
Lond. Passenger Transport :									
A	114½	103	4½	4½	103	–1½	4	7	5
B	117½	102	5	5	102	–1½	4	18	0
C	83½	64¼	4¼	4	65	–1½	6	3	1
West Midland Joint Elec.,									
1948–68	112½	107	5	5	107	–1½	4	13	6
Telegraph and Telephone									
American Tel. & Tel.	180	159	9	9	172½	—	5	4	4
Anglo-Am. Tel. :									
Pref.	101½	89½	6	6	92½	—	6	9	9
Def.	23⅜	19	1½	1½	21	—	7	2	10
Anglo-Portuguese	24/–	19/9	8	8	20/9	—	7	14	2
Cable & Wireless :									
5½% Pref.	95½	75	4½	5½	85	—	6	9	5
Ord.	55	34	4	4	46½	–1	8	12	0
Income	100	95½	—	—	97	–½	4	2	6
Canadian Marconi $1	5/6	3/9	—	Nil	4/3	–3d.	—		
Globe Tel. & Tel. :									
Ord.	31/3	23/6	7½*	7½*	30/–	—	5	0	0
Pref.	26/9	23/3	6	6	23/9	–⅛	5	1	1
Great Northern Tel. (£10)	38	27½	20	20	28	—	7	7	10
Inter. Tel. & Tel.	10½	6⅛	Nil	Nil	6½	+½	—		
Marconi-Marine	30/–	23/–	7½	10	27/6	—	7	5	6
Oriental Telephone Ord.	2½	46/3	12*	12*	2⅞	—	4	16	0
Radio Corpn.	8⅞	5⅛	8	6	5⅛	—	—		
Telephone Props.	14/–	12/9	5	6	13/9	—	8	14	6
Telephone Rentals (5/–)	10/–	8/6	10	10	9/3	—	5	8	1
Western Union	28	19½	2¾	—	23½	—	—		
Traction and Transport									
Anglo-Arg. Trams :									
First Pref. (£5)	7/6	3/6	Nil	Nil	3/9	–⅛	—		
4% Inc.	16	7	Nil	Nil	7½	–1½	—		
British Electric Traction :									
Def. Ord.	1025	700	5	5	800	–75	—		
Pref. Ord.	164	150	8	8	150	–5	5	3	3
Bristol Trams	52/6	37/3	8	10	48/9	—	4	2	0
Brazil Traction	13	7⅞	$1	50c.	8	—	—		
Calcutta Trams	25/6	22/–	8	8	24/–	—	6	13	4
Cape Elec. Trams	18/–	16/9	5	6	17/6	—	6	17	2
Lancs Transport	37/9	32/6	10	10	36/–	—	5	11	1
Mexican Light :									
1st Bonds	25	20	5	5	20	–5	—		
Rio 5% Bonds	81	47	5	5	65	–2	7	9	3
Southern Rly :									
5% Prefd.	75½	48	5	5	57	–1	8	15	6
5% Pref.	99½	79	5	5	79	–3	6	6	7
T. Tilling	2½	39/6	10	10	45/–xd.	–2/–	4	5	2
Tilling & B.A.	54/6	50/–	10	9*	53/9	—	3	7	0
West Riding	37/9	31/3	10	10	36/3	—	—		
Equipment and Manufacturing									
Aron Electricity Ord.	32/3	28/9	15	15	30/–	—	10	0	0
Assoc. Elec. :									
Ord.	45/3	34/9	10	10	38/–	—	5	5	3
Pref.	36/6	34/–	8	8	35/–	—	4	11	5
Automatic Telephone & El.	47/6	39/3	10	12½	45/9	—	5	9	3
Babcock & Wilcox	48/–	37/–	10	12½	43/9	–⅛	5	14	8
British Aluminium Ord.	58/9	48/9	12½	12½	55/9	+9d.	4	10	0
British Insulated Ord.	88/–	77/–	20	20	83/9	—	4	15	10
British Thermostat (5/–)	16/–	12/–	18½	18½	13/9	—	6	14	7
British Vacuum Cleaner (5/–)	22/6	14/–	40	40	15/–	—	—		
Brush Ord.	5/9	4/6	Nil	Nil	5/–	—	—		
Callender's	92/–	60/–	20	15	60/–	–⅛	5	0	0
Chloride Elec. Storage	82/3	62/6	20	15	3⅛	—	4	10	4
Consolidated Signal	96/–	80/9	36½	36½	82/6	—	8	16	9
Crabtree (10/–)	25/6	21/6	17½	17½	22/6	—	7	15	4
Crompton Parkinson :									
Ord. (5/–)	21/–	14/9	12½	15	17/6	–⅛	—		
E. K. Cole (5/–)	9/–	4/–	10	Nil	4/6	–9d.	—		
Elec. & Musical Industries (10/–)	14/9	8/9	10	5	9/9	+9d.	5	2	7
Electric Construction	38/6	30/6	12½	13½	35/–	—	7	14	3
Enfield Cable Ord.	58/6	48/6	25	16⅔	48/9	—	6	6	7
Electrical Switchgear (10/–)	27/–	23/9	16	16	23/9	—	6	14	9
English Electric	36/6	30/3	10	10	34/–	+6d.	5	17	8
Ensign Lamps (5/–)	16/9	13/9	—	25	15/9	–1/–	7	18	3
Ericsson Tel. (5/–)	43/–	35/–	25*	25*	41/3	—	3	0	8
Ever Ready (5/–)	24/–	18/–	35	30	18/–	–6d.	8	6	8
Falk Stadelmann	27/–	18/9	10	6	18/9	–⅛	6	8	0
Ferranti Pref.	25/6	22/6	7	7	23/–	—	6	1	9
G.E.C. :									
Pref.	31/9	29/3	6½	6½	31/3	—	4	3	2
Ord.	82/–	70/9	17½	20	73/6	+6d.	5	8	6
Greenwood & Batley	27/6	24/6	7	15	26/3	—	11	9	0
Hall Telephone (10/–)	22/3	19/3	15	15	20/–	—	7	10	0
Henley's (5/–)	21/–	17/3	20	20	17/6	—	5	14	3
4½% Pref.	23/–	21/–	4½	4½	21/3	—	4	4	8
Hopkinsons	46/3	37/3	12½	15	43/9	–⅛	6	17	7
India-Rubber Pref.	21/3	20/–	5¼	5½	20/–	—	5	10	0
Intl. Combustion	120/–	97/–	32½	32½	5 11½	–⅛	5	14	5
J. Lucas	60/–	52/–	15	15	2⅞	–⅛	5	4	2
Johnson & Phillips	41/3	32/–	12½	12½	38/9	—	6	8	10
Lancashire Dynamo	68/–	57/6	25	25	60/–	—	8	6	8
Laurence Scott (5/–)	12/–	10/–	15	15	10/3	—	7	6	4
London Elec. Wire	31/6	28/6	12	7½	28/9	—	5	4	4
Mather & Platt	50/–	42/6	13½	13½	43/9	—	6	3	3
Metropolitan Elec. Cable Pf.	21/3	21/–	5½	5½	21/3	—	5	3	6
Murex	85/9	63/9	20	20	77/6	+½	5	3	1
Pye Deferred (5/–)	13/9	7/6	25	25	8/–	—	15	12	6
Revo (10/–)	35/6	26/–	17½	17½	26/3	–⅛	6	13	7
Reyrolle	61/–	52/6	12½	12½	56/3	—	4	9	0
Siemens Ord.	26/9	20/6	7½	7½	21/3	–⅛	7	1	2
Strand Elec. (5/–)	5/3	3/9	5	10	3/9	—	3	6	8
S. Smith (1/–)	9/9	6/–	37½	50	8/9	—	5	14	4
Switchgear & Cowans (5/–)	15/–	11/3	20	20	12/–	—	8	6	8
Telegraph Condenser (10/–)	7/6	5/–	5	—	7/6	—	—		
Telegraph Construction	2½	27/6	10	10	38/9	—	5	3	1
Telephone Mfg. (5/–)	10/–	8/–	9	9	8/6	–9d.	5	6	0
Tube Investments	91/–	82/9	23½	23½	85/–	–½	5	13	0
Vactric (5/–)	4/3	2/3	10	4	2/3	—	8	18	0
Vickers (10/–)	24/6	16/3	10	10	17/3	+9d.	5	16	0
Ward & Goldstone (5/–)	22/6	19/6	20	20	19/9	—	5	1	3
Westinghouse Brake	54/9	43/9	17½	17½	47/6	—	7	7	6
Walsall Conduits (4/–)	31/9	24/–	55	55	24/6	–⅛	8	19	6
West, Allen (5/–)	7/6	5/9	7½	10	5/9	–6d.	8	14	0

* Dividends are paid free of Income Tax.

NEW PATENTS

Electrical Specifications Recently Published

Compiled by a firm of chartered patent agents. The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. each) can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1937

29412. "Manufacture of fluorescent discharge tubes." J. H. G. Pearce and Pearce Signs, Ltd. October 27th, 1937. (510433.)

28877. "Electrical musical instruments." R. Pollok-Rudin and E. Werndl. October 23rd, 1936. (510349.)

29846. "Electro-magnetic oscillation apparatus." O. Bormann. November 4th, 1936. (510512.)

30075. "Light-responsive cells." Radio-Akt.-Ges. D. S. Loewe. November 3rd, 1936. (510592.)

33076. "Projection of light, more particularly by the use of alternating-current arcs." H. Martin. November 30th, 1937. (510593.)

36032. "Electric-discharge devices." British Thomson-Houston Co., Ltd., and H. R. Ruff. December 29th, 1937. (510437.)

1938

42. "Excess current high-speed electric circuit breakers." British Thomson-Houston Co., Ltd. January 2nd, 1937. (510595.)

2943. "Electric toggle-operated circuit breakers." Dorman & Smith, Ltd., and T. Smalley. January 31st, 1938. (510521.)

2950. "Apparatus for electric distant control of movement." A. W. Whistlecroft. January 31st, 1938. (510596.)

3054. "Electrically actuated fire-preventing and extinguishing systems for use upon multi-engined aircraft, and devices for use in such systems." Graviner Mfg. Co., Ltd., and A. Mathisen. February 1st, 1938. (510442.)

3137. "Tuning means for wireless receiving apparatus." General Electric Co., Ltd., A. Bloch and G. M. Wells. February 1st, 1938. (510360.)

3184. "Optical systems for television and like apparatus." Baird Television, Ltd., V. A. Jones, and T. C. Nuttall. February 2nd, 1938. (510530.)

3185. "Synchronisation of oscillation generators." Baird Television, Ltd., and L. R. Merdler. February 2nd, 1938. (510531.)

3244. "Negative feedback amplifiers." Telefunken Ges. für Drahtlose Telegraphie. February 2nd, 1937. (510535.)

3277. "Electric lamps." J. Buser. February 2nd, 1937. (510539.)

3294. "Dynamo-electric machines." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. February 5th, 1937. (510541.)

3418. "Tubular electric incandescent lamps." I. Barasch. February 3rd, 1938. (510458.)

3467. "Electrical signalling systems." Automatic Telephone & Electric Co., Ltd., and A. E. Erikson. February 3rd, 1938. (510612.)

3944. "Means for sealing the end of an electric cable." Callender's Cable & Construction Co., Ltd., P. J. K. Davies and R. W. Presswell. February 8th, 1938. (510618.)

4111. "Electrical signalling systems." Evershed & Vignoles, Ltd., and W. T. Marchment. February 9th, 1938. (Cognate application 1802/39.) (510551.)

5596. "Arrangement for determining the amount of high-frequency energy absorbed by a subject during treatment with short or ultra short wave electrical oscillations." Siemens-Reiniger Werke Akt.-Ges. July 9th, 1937. (510368.)

6754. "Electric junction and distributing boxes." Siemens Bros. & Co., Ltd., and C. E. Rose. March 4th, 1938. (510470.)

7389. "Electric motor control systems." General Electric Co., Ltd., and E. H. Croft. March 9th, 1938. (510561.)

8870. "Motor-operated electric switches." R. Jones. August 2nd, 1938. (510373.)

9017. "Oil-immersed electric circuit-breakers." G. Ellison, Ltd., and J. Anderson. March 24th, 1938. (510473.)

10309. "Ceramic insulators." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. April 6th, 1937. (510475.)

11611. "Electric contact relays." W. Popp. April 22nd, 1937. (510566.)

11984. "Cross-bar selecting switches." Standard Telephones & Cables, Ltd. (Western Electric Co., Inc.). April 21st, 1938. (510374.)

15557. "Socket couplings, switch sockets and similar electrical accessories." J. A. Crabtree & Co., Ltd., H. F. McLoughlin and B. G. Harrison. May 25th, 1938. (510377.)

15558. "Socket tubes for electrical apparatus." J. A. Crabtree & Co., Ltd., H. F. McLoughlin and B. G. Harrison. May 25th, 1938. (510378.)

15818. "Cartridge fuses." Callender's Cable & Construction Co., Ltd., and A. W. Metcalf. May 26th, 1938. (510481.)

22107. "Magnetron circuits for use in ultra-high-frequency reception." Marconi's Wireless Telegraph Co., Ltd. July 24th, 1937. (510539.)

22921. "Magnetos." Wico Electric Co. August 20th, 1937. (510382.)

23474. "Capping of electric incandescent lamps discharge tubes and like." Vereenigte Glühlampen und Elektrizitäts Akt.-Ges. August 9th, 1937. (510384.)

24843. "Radio frequency inductance coils and the like." V. S. Goloviznin. April 13th, 1938. (510388.)

26550. "Method of and apparatus for making containers or protective coverings for electric condensers and other objects." M. C. Ducati and A. C. Ducati. September 11th, 1937. (Cognate application 26551/38.) (510393.)

26976. "Radio direction finders." Telefunken Ges. für Drahtlose Telegraphie. September 15th, 1937. (Addition to 508139.) (510394.)

27453. "Protecting device for electrical condensers." Allmänna Svenska Elektriska Aktiebolaget. September 22nd, 1937. (510490.)

28214. "Method of and apparatus for electrical resistance welding of a longitudinal seam in tubing." F. L. Sessions. September 28th, 1938. (510648.)

29414. "Electric condensers and circuits comprising such condensers." Porzellanfabrik Kahla. October 11th, 1937. (Cognate application 29415/38.) (510579.)

31589. "Transformer coils or the like." M. Rosenfeld. November 1st, 1938. (510406.)

31723. "Protecting envelopes for high-tension discharge tubes." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. November 5th, 1937. (510408.)

32505. "Production of alkaline earth metal vapours in closed electric discharge tubes with metal bulbs." Vereinigte Glühlampen und Elektrizitäts Akt.-Ges. November 15th, 1937. (510413.)

34365. "Electric welding machines." British Thomson-Houston Co., Ltd. November 27th, 1937. (Addition to 495484.) (510417.)

34824. "Electric tumbler switches." Manus Manufacturing Co., Ltd., and H. J. Smith. November 30th, 1938. (510657.)

35489. "Thermally controlled delayed-action electric switches." G. Mannheimer. January 15th, 1938. (510658.)

35563. "Joints for air-space-insulated high-frequency electrical lines or cables." Deutsche Fernkabel-Ges. December 6th, 1937. (510497.)

36371. "Electrical attachment plugs." C. C. Gravesden. December 14th, 1937. (510427.)

37314. "Electric resistance heating elements." British Thomson-Houston Co., Ltd. December 28th, 1937. (510588.)

37739. "Gas blast electric switchgear." British Thomson-Houston Co., Ltd. December 29th, 1937. (Cognate application 37740/38.) (510502.)

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75. "Thermionic amplifiers." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. January 4th, 1938. (510503.)

1657. "Obtaining persalts, e.g., persulphates, by electrolysis." C. Trinius and H. Giesler (trading as Giesler & Trinius). February 1st, 1938. (510429.)

6613. "Electrostatic shields." Marconi's Wireless Telegraph Co., Ltd. February 28th, 1938. (510670.)

11727. "Electric lamps." J. Buser. February 2nd, 1938. (Divided out of and addition to 510539.) (510590.)

TRADE MARK APPLICATIONS

THE following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from August 23rd.

Weco. No. 605922. Class 6 (IV). Alloys of magnetic common metals (unwrought and partly wrought).—Western Electric Co., Inc., New York, U.S.A. (British representative: F. C. Tomlins, 152, Coles Green Road, Cricklewood, N.W.2.)

Sintox. No. 608083. Class 7 (IV). Sparking plugs.—Lodge Plugs, Ltd., St. Peter's Road, Rugby.

Eve (design only). No. 603010. Class 9 (IV). Impulse transmitters, high frequency mixing desk switchboards, and other television apparatus.—Fernseh Gesellschaft, Berlin. (British representatives: Boult, Wade and Tennant, 111-112, Hatton Garden, E.C.)

Contactum. No. 604729. Class 9 (IV). Switches, switch plugs, multi-wave plug adapters, wall sockets and switch boxes, all being electrical fittings.—Contactum, Ltd., Victoria Works, Edgware Road, N.W.2.

Saba. No. 604793. Class 9 (IV). Radiotelephonic and telegraphic apparatus and instruments and parts thereof.—Johanna Schwer, trading as the Schwarzwalder Apparate Bau Anstalt August Schwer Söhne, Villingen, Germany. (British representatives: Mathys & Squire, 52, Chancery Lane, W.C.2.)

Isolfuse. No. 606671. Class 9 (IV). Electric switches incorporating fuses.—Brookhirst Switchgear, Ltd., Northgate Works, Newry Park, Chester.

Mary-Ann (lettering and design). No. 606661. Class 9 (IV). Electric vacuum cleaners, flat irons, kettles and tea infusers.—British Electric Domestic Appliances (1938), Ltd., 27, Sandy Lane North, Wallington, Surrey.

His Master's Voice (lettering and design). No. 606684. Class 9 (IV). Electric vacuum cleaning apparatus, dust extractors and component parts (other than motors).—Gramophone Co., Ltd., Hayes, Middlesex.

Glista (lettering and design). No. 607065. Class 11 (IV). Lamp shades.—William Stannard & Co., Ltd., Buxton Road, Leek, Staffs.

CONTRACT INFORMATION

Particulars of work for which tenders are invited, contracts placed, and building schemes promising work for electrical contractors and traders

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses. Further details of items marked with an asterisk can be obtained from the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, London, S.W.1.

Argentina.—BUENOS AIRES. — October 2nd. Two pumping sets with switchboards, transformers, cable, &c. Argentine National Sanitation Department. (T.Y. 25937/39.)*

Australia. — MELBOURNE.—September 19th. Posts and Telegraphs Department. Automatic telephone switching equipment. (T. 25751/39.)*
September 19th. Telephone and telegraph cable. (T. 25750/39.)*
September 26th. Automatic generator voltage regulators. (T. 25902/39.)*
September 26th. Telephone transformers. (T. 26136/39.)*
December 12th. State Electricity Commission of Victoria. Two 12,000-kW water-driven turbo-generators and accessory plant. (T. 25686/39.)*
September 19th. Three 300-kVA, 72,000-66,000/22,000-V, three-phase, 50-cycle, oil-insulated self-cooled outdoor transformers. (T. 26317/39.)*
BRISBANE.—October 11th. Electrically driven pumping unit comprising pump, motor, discharge column in well, shafting and control gear, &c. Department of Irrigation, Water Supply & Sewerage, Executive Building, George Street, Brisbane. (T. 26172/39.)*
PERTH.—November 2nd. Western Australia Government Tender Board. Supply and delivery of two 500-kW mercury arc rectifiers, switchgear, feeders, control system, &c. (T. 26439/39.)*

Barrhead. — September 14th. Town Council. Sewage purification works, &c. Forms from Leitch & Sharpe, 65, Bath Street, Glasgow, C2 (deposit £2 2s.). Tenders to Town Clerk.

Bristol.—September 6th. Electricity Department. E.h.v. switchgear, l.v. substation switchgear, and 6.6-kV and 11-kV transformers. (August 18th.)
September 5th. Corporation. Installation of electrical services in the clinics at Southmead Hospital. (August 18th.)

Dewsbury.—September 11th. Borough Council. Supply of electrical stores. (See this issue.)

East Grinstead. — September 6th. U.D.C. Cables for twelve months. (August 25th.)

Egypt.—CAIRO.—September 30th. Four pumps for Kafr El Elw Central power station. Tanzim Department, Ministry of Public Works. (T. 26146/39.)*
October 18th. Extension of the electrical network at Damietta. Municipalities Department. (T. 26152/39.)*
September 21st. Supply, delivery and erection of equipment for extension of electric light installation at Minieh. (T. 26151/39.)*

Glasgow.—September 15th. Corporation. Installation of a low-pressure hot-water system in new reception and sanatorium blocks at Woodilee Mental Hospital extension, together with the supply and installation of electrode water heating units and controls, electrode steam boiler units and controls for kitchen, &c., apparatus, and supply only of immersion heater units for the domestic hot water service. Forms (£2 2s.) from the Medical Officer of Health, Sanitary Chambers, 23, Montrose Street, Glasgow. Tenders to Town Clerk.

High Wycombe.—September 8th. Town Council. Wiring and new fittings at town hall. Specifications from borough surveyor, Municipal Offices.

India.—NEW DELHI.—November 28th. Indian Stores Department Electrical Section. DC ceiling fans. (T. 25344/39.)* AC ceiling fans. (T. 25345/39.)*
June 9th, 1940. AC and DC table fans. (T. 35343/39.)*
SIMLA.—September 14th. Indian Stores Department, Electrical Branch. Bare copper conductors. (T. 25927/39.)*
September 14th. Three single-operator DC arc welding generators, rated 250 A, and two 12/14 BHP Diesel oil engines. (T. 26131/39.)*
September 7th. Condensers (50 kVA) for power factor correction, one p.f. meter and three 22½-kW motor-generator sets with control gear. (T. 26180/39.)*

Iraq.—BAGHDAD.—October 24th. Central Foreign Purchasing Board. Underground cables and accessories. (T. 25439/39.)*

Kirkcaldy.—September 9th. Automatic fire-fighting installation. (August 18th.)

Manchester. — September 7th. Electricity Committee. Two switchgear operating batteries and charging equipment. (August 25th.)
September 21st. Switchgear busbar protective equipment. (August 25th.)

Newport (MON).—September 11th. Electricity Department. One turbine-driven and two motor-driven boiler feed pumps. (August 25th.)

New Zealand.—WELLINGTON.—September 21st. Metal-cased condensers. (T. 25604/39.)*
October 24th. One 110-kV, three-phase, outdoor isolating switch. (T. 25830/39.)*
October 24th. 11,000-V switchgear and associated equipment. (T. 25831/39.)*
November 14th. Supply of 50-kV, three-phase, outdoor switchgear and steelwork with insulators and accessories. (T. 26179/39.)*
September 20th. 60,000 porcelain or composition insulators. Stores Division, General Post Office, Wellington, C.1. (T. 25828/39.)*

Nottingham.—September 21st. Corporation. Insulated food trolleys for the city hospital. (August 18th.)
County Council. Contractors desirous of tendering for the electrical installation at the new county hall and offices must send their names and addresses by September 2nd. (August 18th.)

Pembrokeshire.—September 29th. Renewal of fog-signalling machinery and installation of electric light generating plant at the South Bishop lighthouse off the Pembrokeshire coast. Secretary, Trinity House, Tower Hill, London, E.C.3.

Salford.—September 6th. Corporation. Fire extinguishing plant and transformers. (August 25th.)

Shipley.—September 6th. Electricity Department. Cables for twelve months. (August 25th.)

South Africa.—JOHANNESBURG. — September 9th. City Council. Copper conductors. (T. 25656/39.)*
September 13th. Seven cable test sheath fault detector panels. (T.Y. 25662/39.)*
September 13th. Twelve 250-MVA and 24 150-MVA metal-clad triple-pole, oil-immersed circuit-breakers. (T. 25985/1939.)*
September 13th. Eleven lightweight two-seater passenger electric coupés and three 5-8-cwt. electric delivery vans having two-seater driving cabins. (T. 26293/39.)*
September 16th. Trolley-bus overhead equipment. (T. 26113/39.)*
November 17th. 33-kV switchgear and auxiliary plant. (T. 25663/39.)*
PRETORIA.—September 14th. Public Works Department. Transformers and switchgear. (T.Y. 25882/1939.)*
September 7th. Union Tender & Supplies Board. Seventy-two floodlights for hangar lighting at various centres. (T. 25653/39.)*
September 7th. Architectural lamps. (T. 25647/39.)*
September 14th. Motors and switches. rectifier, drum controller and grid resistance starter. (T. 26125/39.)*
September 28th. Union Tender and Supplies Board. Low-voltage cable and end and joint boxes. (T. 26367/39.)*
PORT ELIZABETH.—September 14th. Electrical Engineer's Department. Galvanised steel poles, time switches, tail end switches and extra-high-voltage cable. (T. 26353/39.)*
PIETERMARITZBURG. — September 6th. Electric cooking apparatus and food mixer. (T. 25648/39.)*
NATAL. — September 6th. Electric laundry machinery, cooking and food preparation equipment and refrigerator. (T.Y. 25664/39.)*

Stockton.—September 1st. A.R.P. Committee. Labour and materials for lighting Chestergate air raid shelter. (180 points). Tenders to Chairman, A.R.P. Committee, c/o borough surveyor, Town Hall.

Stoke-on-Trent.—September 13th. North West Midlands J.E.A. Three transformer kiosks. (August 18th.)

Warrington.—September 18th. Electricity Department. Extra-high and low-voltage, paper and lead-covered and other cables; earthenware conduits and concrete slabs, tiles and covers for twelve months. (See this issue.)

Orders Placed

Dartford.—Electricity Committee. Recommended. Kiosk, transformer and switchgear (£396).—Crompton Parkinson, Ltd.

Friern Barnet.—General Purposes Committee. Recommended. Electrical installation at Council offices: Main installation (£985).—E. Wight & Co. Floodlighting of depot (£124).—Colston Electrical Co. Lighting installations for A.R.P. control centre (£58).—Troughton & Young, Ltd.

Nottinghamshire.—County Health Committee. Accepted. Electrical work at county sanatorium (£3,146).—Thomas Danks & Co., Ltd.

Renfrew.—Town Council. Accepted. Electrical work at Porterfield Nos. 6 and 7 Housing estates.—Kennedy, Stark & Co. (£800), and J. Bell & Sons (£973).

Rhyl.—U.D.C. Accepted for the change-over: Cables (£1,576).—Henley's. High-voltage feeder and switchgear (£1,628).—Erskine, Heap & Co.

Southall.—General Purposes Committee. Accepted. Electrical installation at new town hall (£6,239).—Duncan Watson (Electrical Engineers), Ltd.

Radio Relay Statistics

AT June 30th there were 254,514 subscribers to 323 radio relay exchanges, compared with 256,692 subscribers to 324 exchanges at March 31st. A decline in the number of subscribers is usual during the summer months, but it should be noted that the number at June 30th was greater than it had been at this date in previous years. Manchester is likely to be the first town to have the new Post Office radio-by-telephone service. Work is proceeding at telephone exchanges there in connection with the scheme. A receiving station for obtaining foreign programmes for the service is being set up at Edinburgh. It is understood that the new service may be available in Edinburgh by the end of the year.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aberavon.—Factory, six-acre site, for Cambrian Can & Drum Factory; I. Decca, managing director.

Adwick-le-Street.—New council offices (£16,000); Stapley & Davison, architects, 22, Queen's Square, Leeds.

Angmering.—Senior school; West Sussex county architect, County Hall, Chichester.

Ashton-on-Makerfield. — Houses (72), Rectory estate (£23,531); U.D.C. surveyor.

Baillieston (LANARKSHIRE).—Cinema (£27,000), for P. Crerar; T. B. Gibson, architect, 19, Manor Place, Edinburgh.

Birmingham.—New factory in Graham Street, for St. Paul's Printing Label Co.

Bishop Auckland.—Emergency hospital; W. Eaves and Co., builders, Blackpool.

Blackpool.—Hostel, Bloomfield Road, for L.M.S. Railway; W. H. Hamlyn, chief architect, St. Pancras Chambers, N.W.1. Bungalows (42), The Castle, North Shore; L. Wright, Board Street.

Bridgend.—Additions and alterations to Bridgend and District Hospital, for Committee; Arthur G. Edwards, architect, 29, Park Street.

Bromsgrove.—Fire station, Recreation Road, for U.D.C.; F. A. Jessop, clerk, Council House.

Chatham.—Senior school, Magpie Hall Road, for E.C.; R. L. Honey, architect, Town Hall.

Chester.—Senior girls' school, Eaton Road, for Diocesan Church Schools Association; F. Charles Saxon, architect, 2, Stanley Street.

Cirencester.—Houses (26), Fairford, Frampton Mansell and Somerford Keynes, for R.D.C.; Eric Cole & Partners, architects, Dyer Street House.

Corby.—School; Northants Education Committee.

Cradley Heath.—Rebuilding and extension of offices, for Cradley Boiler Co., Ltd., Woods Lane, Cradley Heath; J. Harper & Sons, builders, Blackheath, Birmingham.

Crook (Co. DURHAM).—Cinema, South Street, for S. Sheckman; J. H. Morton & Son, architects, Martins Bank Chambers, Fowler Street, South Shields. Houses (61), Wheatbottom estate; North Eastern Housing Association, Ltd.

Dalton-in-Furness. — Houses (30), Thornton Park, for U.D.C.; E. B. Jackson, surveyor, Town Hall.

Dartford.—Houses (144), Princes Road estate; W. J. Draper & Son.

Davenham (CHESHIRE).—Estate development, Hartford Road; L. R. Flaws, architect.

Dearne Valley.—Pumping station, Roebuck Cross roads, Wombwell, and sluice valve house, Darfield, for Water Board; Engineer and manager, Waterworks Office, Broomhill, Wombwell, near Barnsley.

Dewsbury.—Houses (160), School Lane (£56,969); borough engineer.

Eire.—COUNTY KILDARE.—New cottage hospital, Athy, for Board of Health; A. E. Smith, surveyor, 19, Upper Merrion Street, Dublin.

CAVAN.—County tuberculosis institution, for Board of Health; Morris and Kavanagh, surveyors, 68, Harcourt Street, Dublin.

Feltham.—Factory (£16,000), Vineyard Road; Walker (Tooting), Ltd., builders, 99, Beddington Lane, Croydon.

Friern Barnet.—Extensions to factory, Roman Road; Drugs, Ltd.

Gainsborough. — New administrative block, Foxby Hill Isolation Hospital, for U.D.C.; Stanley Algar, surveyor, Council Offices.

Gateshead.—Houses (136), for the North-Eastern Housing Association; Lane, Fox and Co., Ltd., builders, Norton Road, Stockton-on-Tees. New premises (£12,000), for Gateshead Dispensary; Fennell & Bradley, architects, 16, West Street. Large extensions to the works of British Ropes, Ltd.; John Milne & Sons, contractors, Westfield Joinery Works, Coatsworth Road.

Great Barr (BIRMINGHAM).—School, Pheasey estate, for Staffordshire C.C.; F. A. Hughes, director of education, County Education Offices, Stafford.

Greenock.—Reconstruction of Prince's Pier (£90,000), for Harbour Trust; W. S. Coutts, chairman.

Halesowen.—Stores, High Street, for F. W. Woolworth & Co., Ltd.

Hampshire. — School, Lymington (£28,740), for the County E.C.

Harborne (BIRMINGHAM). — School (£24,350), for St. Peters C.E. school managers; H. W. Simister, architect, Norwich Union Chambers, Congreve Street.

Hatfield.—Maternity and child welfare centre, for Herts C.C.; Courtenay & Crickmer, architects, 1, Lincoln's Inn Fields, W.C.2.

Hillington (GLASGOW).—Factory, for British Salmson Aero Engines, Ltd., Merton By-Pass Road, Wimbledon, S.W.20.

Horsham. — Two senior schools (£62,000); West Sussex county architect, Chichester.

Hounslow.—Houses (26); West London Building Supplies, 84, Grosvenor Street, London, W.1.

Ilford.—Flats (218), Claybury Park estate, Roding Lane, for Bunting Construction Co., Ltd.; A. N. Baker, staff architect, 49, Baker Street, London, W.1.

Kent.—Buildings for grammar school, Ashford. Library, Rainham. Premises for Skinners school, Tunbridge Wells. Premises for Walthamstow Hall school, Sevenoaks. Remand home, Harrietsham. Elementary school, Whitfield, for the County E.C. Technical college, Ramsgate. Extensions to grammar school, Dartford. County architect, Sessions House, Maidstone.

Lanarkshire.—Additions to the New Stevenston R.C. school, for the C.C. (£28,000); architect, County Council, Hamilton.

Lancashire.—Clinic, Great Harwood (£6,200). Library, Knowlsley (£4,580). Library, Queen's Square, Poulton-le-Fylde. Police quarters, Hutton (£40,000). Schools, Netherton (£22,620), Butterstile Lane. Prestwich (£20,680), Atherton and Whitfield (£13,690). Enlargement of senior school, Urmston (£13,540). County architect, County Offices, Preston.

Leamington.—Cinema, Warwick Terrace; C. Upfill Jagger & Son.

Litherland.—Houses (72), Moss Lane (£27,262); U.D.C. surveyor.

Llantrisant and Llantwit Fardre.—Houses (22), Trebanog and Gilfach Goch, for R.D.C.; Thomas Saunders, surveyor, Council Offices, Poltyclun, Glam.

London.—(DEPTFORD).—Cinema, Deptford High Street, for A.B.C., Ltd.; W. R. Glen, architect, 30-31, Golden Square, London, W.1. (FULHAM).—Redevelopment of Avenue area (£195,000); borough engineer.

Murton (Co. DURHAM). — Cinema, Knaresborough Road; Knaresborough Theatre Co., Ltd.

New Malden.—Furniture showrooms and stores, King's Avenue, for W. H. Bird, Ltd., Malden New Road; C. Davison, architect, Coombe Road.

New Seaham.—Houses (183); North-Eastern Housing Association, Ltd. Houses (14), Burden estate; Major C. D. Gregson.

Newcastle-on-Tyne.—Showrooms, Clayton Street, for James & Co.; C. Solomon, architect, 187, Osborne Road. Customs office, Newcastle Quay; city engineer, Town Hall. Houses (24), Parkside Avenue; W. Smelt, builder, Severus Road. Houses (18), St. Alban's Crescent; Wilkinson Brothers, builders, 205, High St., Gateshead-on-Tyne. Offices, Blenheim Street, for W. H. Cole; T. K. White, architect, 33, Groat Market. Six shops, Sutton Street, and the Fossway; A. Anderson (Contractors), Ltd., Stanmore Road, Newcastle-on-Tyne. Shops and offices, Princess Street, for the Pilgrim Investment Trust; C. S. Errington, architect, 46, Grainger Street. Workshops, &c., for the Heaton Foundry Co.; H. Waller, builder, Back Waller Street.

Old Fletton.—Houses (48), Stanground, for U.D.C.; T. Ashcroft, surveyor, Council Offices, Old Fletton, near Peterborough.

Orpington. — Houses (72), Southend Avenue, St. Leonards Rise, and Melrose Crescent; Davis Estates, Ltd., Kilburn High Road, London, N.W.6.

Pagham (SUSSEX).—Residential school, Lagoon estate; L.C.C. architect.

Petersfield.—Fire station, Rake Road, Liss, for R.D.C.; surveyor, Old College.

Portrush.—New clubhouse (£12,000), Bushmills Road section, for Royal Portrush Golf Club; secretary.

Pulborough.—Senior school (£19,000); West Sussex county architect, Chichester.

Reading.—Large factory, Basingstoke Road, for Eden Fisher & Co., Ltd., London; Gee, Walker & Slater, Ltd., builders, 3, Fitzmaurice Place, London, W.1.

Rhyl.—Holiday camp; J. L. Griffiths, architect, 70, High Street.

Rushden (NORTHANTS).—Extensions to sanatorium (£6,720); Childs & Co.

Ryhope.—Houses (92), (£33,565); Sunderland R.D.C. surveyor.

Saffron Walden.—Houses (24), Chapel Hill, Stansted; Stansted Mountfitchet Holdings, Ltd.

St. Albans.—Houses (1,400); T. F. Nash Homes (St. Albans), Ltd., Marshalswick Lane.

Salford.—Block of shops, Cross Lane and Unwin Street, for T.C.; borough surveyor.

Scunthorpe.—Town hall (£62,996); borough engineer.

South Shields.—Offices, Thrift Street, for the Tyne Dock Engineering Co., Ltd.; M. Swales, Ltd., builders, Imeary Street.

Shropshire.—Senior school, Beachfield estate, Oswestry, for County E.C.

Stocksbridge (YORKS).—Houses (30), on Grange Road estate; J. Wharton, builder, Ingrow Bridge, Keighley.

Sunderland.—New day schools at St. Anthony's; D. & J. Ranken, Ltd., contractors, Stockton Road. Sub fire station and firemen's dwellings, Fulwell, for T.C.; borough engineer, Town Hall. R.C. school for the Rev. Morrissey; J. Cummings, builder, Matamba Terrace, Sunderland.

Tanfield Lea (Co. DURHAM).—New school (£12,000); R. Southren, builder, Saw Mills, Dipton.

Tynemouth.—Three blocks of flats, Tyne Street and Stephenson Street, for the T.C.; borough engineer, 19, Howard Street, North Shields.

Uxbridge.—Houses (302), Violet Farm housing estate, for U.D.C.; surveyor.

Wakefield.—Houses (32), and shop, off Water Lane, Coxley, Middlestown; Aked and Riley. Houses (12), Oakenshaw estate, Crofton; Searby Bros.

Walsall.—Cinema, Fellows Park, for the Magnet Entertainments, Ltd., High Street, Wednesbury; H. Robinson, architect, Cherry Street, Birmingham. Houses (154), Green Rock Lane, South Housing estate, and houses (11), Barracks Lane Housing site, for T.C.; M. E. Habershon, borough surveyor, Council House. Factory buildings in Bradford Street; Kendrick & Son, builders, Tasker Street.

Wallsend.—Hotel, Churchill Street, for A. Arrol and Sons, Ltd.; Hastie D. Burton, Ltd., builders, King Street, North Shields. Tenements (80), High Street; J. H. Morton & Son, architects, Martin's Bank Chambers, Fowler Street.

Wantage.—Houses (141), for R.D.C.; D. J. Cook, builder, Church Oakley, near Basingstoke.

Warwickshire. — Senior school, Southam, for E.C.; A. C. Bunch, county architect, Shire Hall, Warwick.

Washington (Co. DURHAM).—Hotel, site of Southgate Villa; J. Jeffrey & Co., Ltd.

West Bromwich.—Factory, Friar Park, for Industrial Fan and Heater Co., Anne Road, Smethwick, Birmingham, 21.

West Hartlepool.—Factory and offices, Brenda Road; Head, Wrighton Stampings, Ltd.

Wigan. — C.E. School, Upholland (£20,000); Rowland Stubbs, architect, 14, Cook Street, Liverpool.

Willesden.—School for physically defective children, Kingsbury, for E.C.; F. Wayman Brown, architect, Education Offices, Dyne Road, Kilburn, N.W.6.

Winchester.—Fire stations at New Alresford and West End, for R.D.C.; Edward G. Breed, surveyor, 45, Romsey Road.

Wolviston (Co. DURHAM).—Houses (17), Kendrews Builders, Ltd.